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October 2025



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1C101 Your Project...

Job #: 23-1006
PartID: 384
Sequence: Main Steel
Weight(Asm): 359.19
Weight(Indv): 304.3

6 x 6 x 3/8
17' - 11" 1/8
PartID: B1063
Wght(Asm): 500.87
Wght(Bundle): 1001.74
City: 2
Finish: PNT
Route: SP 01/06/2025

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Step 1: Select a worker
Worker: Alejandro Magdaleno
Passed Inspection Part ID: 260

Step 2: Inspection Summary
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Other	Pass
Running Dimensions	Pass
Hole Dimensions	Pass
Clean and Weld Prepared	Pass
Offsets	Pass
Plate Thickness	Pass
Over All Dimensions	Pass

Load: 15

Trailer: ABF3050
Carrier: DBX Hauler...
From: Main Steel
Destination: Jobsite

Loaded Weight: 81%
38803.69 / 48000.00

Scans on load: 8
Part ID: 52803
Main Mark: B133
Weight: 18447.58

Inventory

Connection to Tekla PowerFab

Start with 'Receive' to confirm Purchase Order items and add them to inventory.

Step 1: Receive
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Actions: Take From Stock, Take From Stock Manual, Move

Additional Tools: Tool: Reprint Labels

Modern Steel Construction

October 2025

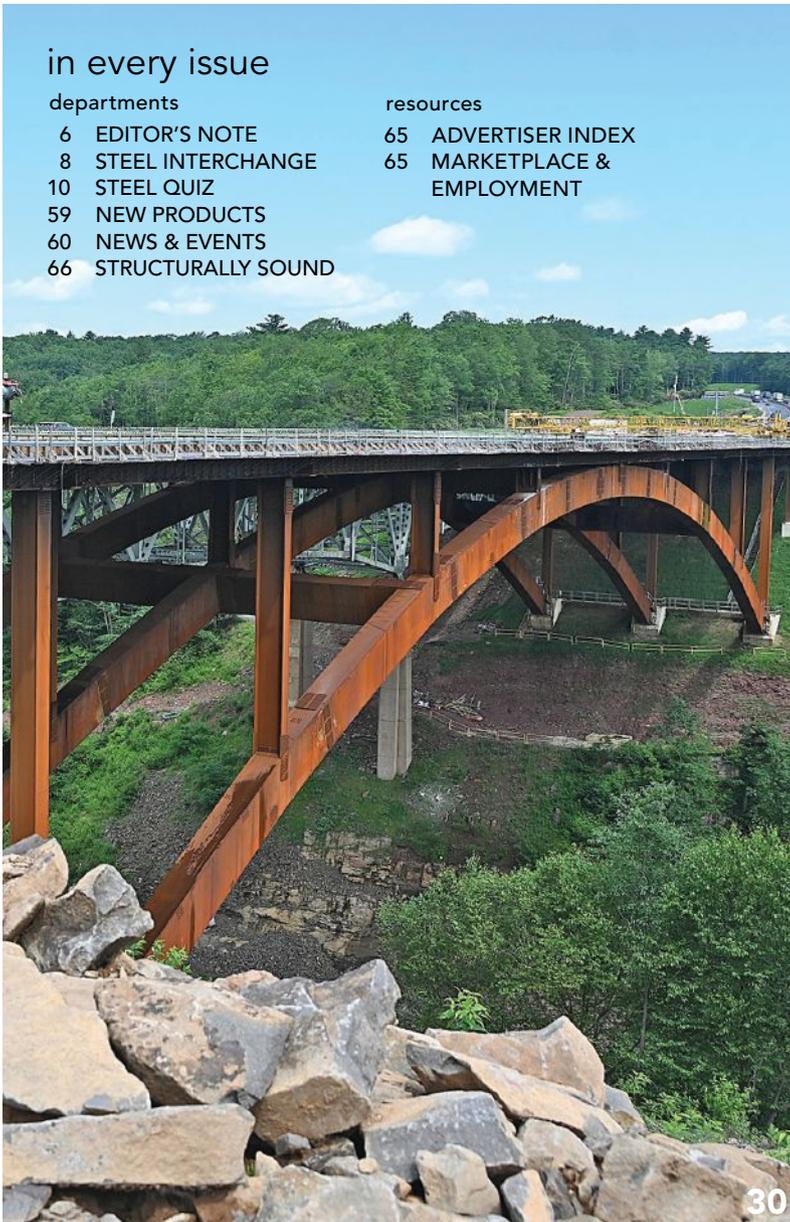
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ON THE COVER: A hybrid steel-CLT vocational training center recently opened in Kalamazoo, Mich., p. 22. (Image: Lesley Michelle/KRESA).

MODERN STEEL CONSTRUCTION (Volume 65, Number 10) ISSN (print) 0026-8445; ISSN (online) 1945-0737. Published monthly by the American Institute of Steel Construction (AISC), 130 E Randolph Street, Suite 2000, Chicago, IL 60601. Single issues \$8.00; 1 year, \$60. Periodicals postage paid at Chicago, IL and at additional mailing offices. Postmaster: Please send address changes to MODERN STEEL CONSTRUCTION, 130 E Randolph Street, Suite 2000, Chicago, IL 60601.

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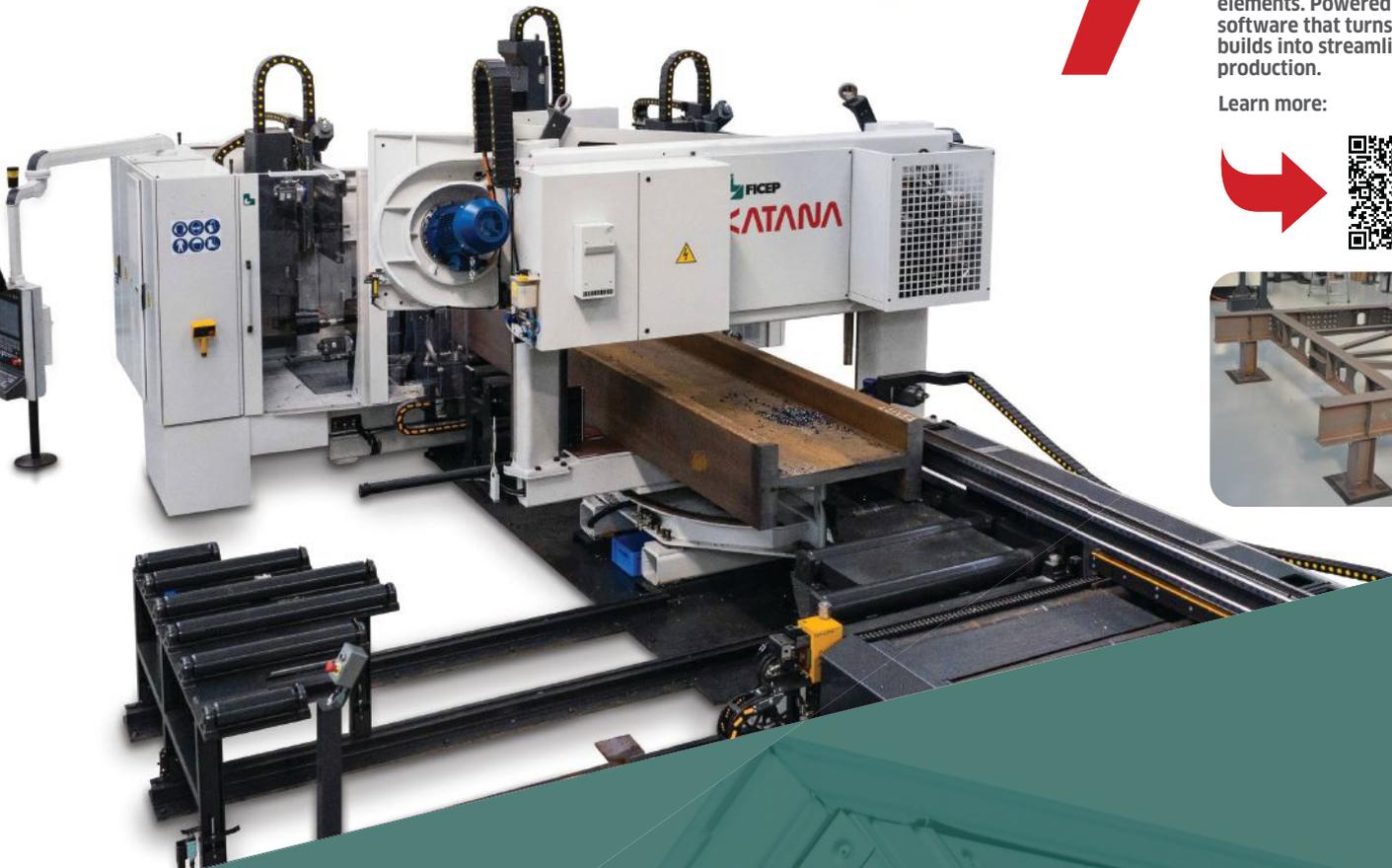
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editor's note



Long story short, it's a bike ride. Across Iowa. It started in 1973, when two intrepid reporters from the *Des Moines Register* came up with the idea to ride across the entire state and document their journey. When they decided to open the event to the public, they unwittingly created what would eventually become the largest bike-touring event in the world.

The acronym stands for the *Register's* Annual Great Bike Ride Across Iowa. The weeklong route changes every year, starting at the western edge of the state and ending in the east. It averages around 460 miles, with most riders ceremoniously dipping their back tires in the Missouri River at the start and their front tires in the Mississippi upon completion. This year, I joined up with some folks for the last stage, a 62-mile jaunt from Oelwein to Guttenberg via back roads and state highways through a handful of small towns—each with a street festival—past countless farms (lots of corn, soybeans, and pigs), and up and down some rather steep hills. People come from around the world to do this. I saw several teams riding in tight packs with matching jerseys, a handful of pairs on tandem bikes, and even one brave (insane?) soul on a unicycle. It was a remarkable experience, and I plan to do the entire thing sometime in the next few years.

Another weeklong tour of sorts, and one that doesn't require any training (or a bicycle), that takes place across the entire country is SteelDays. While not as old as RAGBRAI—this annual event started in 2009—it's a celebration of the domestic fabricated steel industry, hosting construction industry professionals, students, and even members of the general public. Over the last decade and a half, thousands of attendees have visited steel facilities and projects nationwide to connect with industry leaders, explore career opportunities, and gain firsthand insight into the world of structural steel.

If you're not headed to an in-person tour, you can participate in SteelDays with just a computer or phone. This year's free

This past summer, in late July, I rode the final stage of RAGBRAI.

What is RAGBRAI, you might wonder?

SteelDays webinar focuses on AI and will be presented by AISC's director of technology initiatives, Luke Faulkner. Visit aisc.org/steeldays each day from October 20–24 to find trivia items, steel-themed Wordles, hidden-gem AISC resources, and much more.

You can also read a recap of last year's activities in the January 2025 article "Cross-Country Celebration" in the Archives section at modernsteel.com. And for even more detail on one of last year's SteelDays events—a tour of a soon-to-be-opened hospital at the Atrium Health Carolinas Medical Center campus in Charlotte that drew dozens of attendees last October—take a look at the article "Meeting the Moment" in last month's issue, also available in the Archives section.

In fact, go to that story right now. (I'll wait.) On the opening spread, you'll see a Speed tag, just as you'll see Quality and Sustainability tags on two of this month's project articles. You may have also noticed similar tags in feature stories over the last few months, such as Adaptability, Cost, and Resilience. (Check out aisc.org/design-principles for more on each.)

While we love to promote real-life examples of successful and fantastic domestically fabricated steel projects, we also want to ensure that we're calling out the major steel advantage of each one, the major component that sets steel apart from other structural materials. Do most projects that we feature embody more than one, if not all, of these advantages? Of course! But one word can speak volumes, and this new approach helps us tell the steel story in a more organized way. It also helps steel teams by proactively trumpeting their biggest success on a project, and it helps you think about what story (or stories) you want to tell people about your own steel projects moving forward.

Geoff Weisenberger
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steel interchange

If you've ever asked yourself "Why?" about something related to structural steel design or construction, *Modern Steel's* monthly Steel Interchange is for you!

Send your questions or comments to solutions@aisc.org.

Missing HSS Shapes from Table 3-12

When using Table 3-12 in the AISC 16th Edition *Steel Construction Manual*, there does not appear to be flexural strength information for the new HSS16x6 shapes. Why were these shapes not included?

Part 1 of the 16th edition *Manual* has 210 new HSS shapes. To limit the number of pages added to the *Manual*, design tables for these added shapes are included in the *Manual Companion Volume 2* as opposed to the *Manual* itself. They can be downloaded for free at aisc.org/designexamples.

Heather Gathman

Truss Bracing

Concerning the design of a structural steel truss composed of wide-flange top and bottom chords and HSS webs, a slab-on-deck is supported on the top flange of the top chord. There are no members that frame between the top chords of adjacent trusses. While the top flange is laterally braced by the slab-on-deck, there is no out-of-plane bracing of the bottom flange of the top (compression) chord. Is there guidance for determining the appropriate design of the top chord in axial compression?

For doubly-symmetric members that are subjected to axial compression with minor-axis lateral bracing offset from the shear center, 2022 AISC *Specification for Structural Steel Buildings* (download at aisc.org/specifications) Equation E4-10 is applicable. This equation is for the limit state of constrained-axis buckling, which is the controlling buckling mode when lateral bracing is offset from the shear center. Constrained-axis buckling is where the column buckles in a flexural-torsional mode, rotating about the point of lateral support. The possible buckling modes are described below:

Flexural Buckling. For the flexural buckling mode, the unbraced length is the distance between points that are restrained against lateral translation. These lateral braces are assumed to be located at the shear center. The braces must restrain lateral translation of the entire cross section, including the top and bottom flanges. The provisions in *Specification* Section E3 are applicable. For compression members with bracing at only one flange, engineers often neglect the flange bracing and design only for flexural buckling. In this case, the flange braces are neglected, resulting in a conservative solution.

Torsional Buckling. For the torsional buckling mode, the unbraced length is the distance between points that are restrained against torsional rotation. These torsional braces are assumed to restrain the entire cross-section. The cross-sectional location of torsional braces is not critical; however, cross-section distortion should be considered if any of the cross-sectional elements are unrestrained. Equation E4-2 in *Specification* Section E4 is applicable. When the unbraced length for torsional buckling is equal to the unbraced length for flexural buckling, the flexural buckling strength will always be lower than the torsional buckling strength.

Constrained-Axis Buckling. When the brace is offset from the shear center, constrained-axis buckling can occur, where the column buckles in a flexural-torsional mode about the point of lateral support. To consider the effect of minor-axis lateral bracing that is offset from the shear center, *Specification* Equation E4-10 is applicable.

Because this constrained axis buckling mode is characterized by a buckled shape with lateral translation and twisting, the unbraced length is the distance between points that are braced both laterally and torsionally. In this case, both lateral translation and torsional rotation (twisting) must be restrained at the brace points. Therefore, the unbraced length for constrained-axis buckling is equal to both the flexural and torsional buckling unbraced lengths. The constrained-axis buckling strength is always higher than the flexural buckling strength and always lower than the torsional buckling strength. When the constrained-axis buckling limit state is applicable, neither the flexural buckling nor the torsional buckling limit states are applicable.

Constrained-axis buckling is discussed on Page 36 of AISC Design Guide 25: *Frame Design Using Nonprismatic Members*, Second Edition (download or order at aisc.org/dg). The theory behind the equation is in the classic book, "Theory of Elastic Stability," by Timoshenko and Gere. For wide-flange shapes, design examples and tables are found in the paper "Torsional and Constrained-Axis Flexural-Torsional Buckling Tables for Steel W-Shapes in Compression" in the fourth-quarter 2013 *Engineering Journal*.

Bo Dowswell, PE, PhD

Steel Interchange is a forum to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Contact Steel Interchange with questions or responses via AISC's Steel Solutions Center: 866.ASK.AISC | solutions@aisc.org. The complete collection of Steel Interchange questions and answers is available online at www.modernsteel.com. The opinions expressed in Steel Interchange do not necessarily represent an official position of the American Institute of Steel Construction and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principles to a particular structure.

Chevron Brace Force Distribution

I am having a difficult time following the beam shear calculation of $V_u = 174$ kips in Design Example 5.9 of AISC Design Guide 29: *Vertical Bracing Connections—Analysis and Design*. Figure 5-19 provides the layout of the chevron brace connection.

LRFD
$V_u = 204 \text{ kips} - 30.3 \text{ kips}$ $= 174 \text{ kips}$
From AISC Specification Section G2.1, the available shear yielding strength is:
$\phi V_n = \phi 0.6 F_y A_w C_v$ $= 1.00(0.6)(50 \text{ ksi})(0.570 \text{ in.})(27.3 \text{ in.})(1.0)$ $= 467 \text{ kips} > 174 \text{ kips} \quad \mathbf{o.k.}$

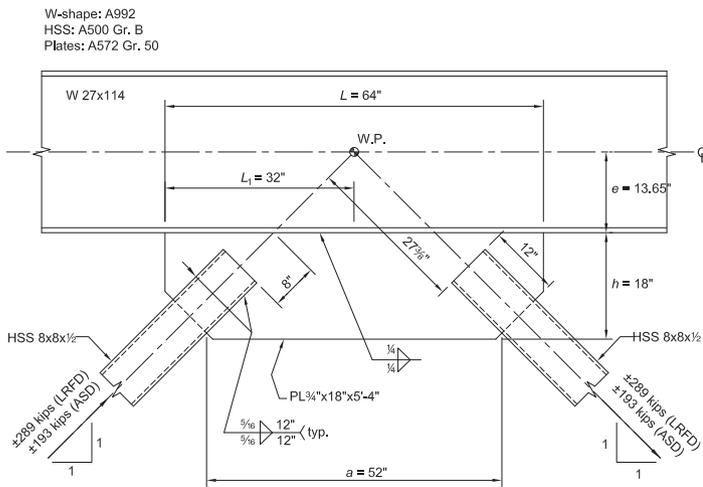


Fig. 5-19.

In the calculation shown in the Design Guide (using LRFD), the 204 kips represent the vertical component of the brace and 30.3 kips is the shear in the gusset, which is shown in Figure 5-20 of the Design Guide. With 30.3 kips of shear in the gusset, the remainder of the shear is in the beam web. Section 4.1.2 provides further discussion on chevron bracing connections.

The calculated beam shear of 174 kips can also be determined using free body diagrams as a quick check to confirm that the equations in the design guide have been used correctly. The July 2015 steel quiz (find at modernsteel.com/archives) provides an example.

The load distribution used in Design Example 5.9 is illustrated in Figure 1. Figure 2 isolates the beam element and indicates that a moment of 5,560 kip-in. is needed to account for the 13.65-in. eccentricity in the transfer of 408-kip horizontal component from both braces. This moment can be resolved into a force couple with

forces placed at the midpoint of the portion of the gusset transferring tension and compression forces (see Figure 3). This force is equal to $5,560 \text{ kip-in.} / 32 \text{ in.} = 174 \text{ kips}$, which matches the shear calculated in the Design Guide. Figure 4 illustrates the forces in the beam at the brace work point. Note that $204 \text{ kips} \times 13.65 \text{ in.} = 174 \text{ kips} \times (32 \text{ in.} / 2)$. The forces balance.

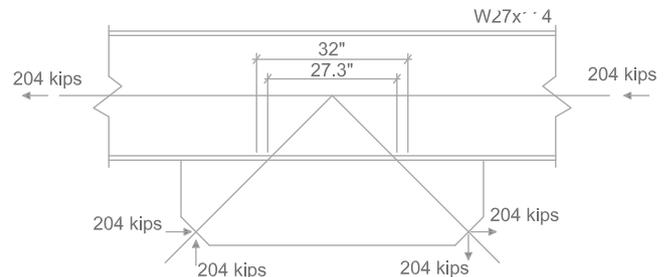


Fig. 1. Load distribution

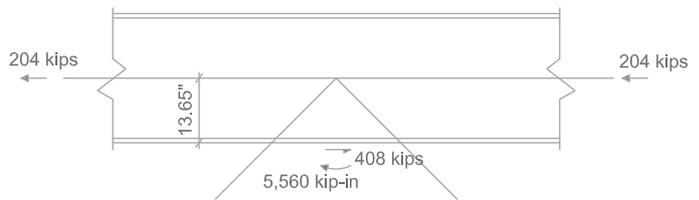


Fig. 2. Moment at gusset-to-beam flange interface

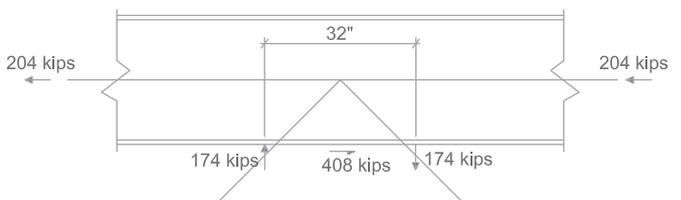


Fig. 3. Moment resolved into a force couple



Fig. 4. Shear at the brace work point

Carlo Lini, SE, PE

Carlo Lini (lini@aisc.org) is the director of the AISC Steel Solutions Center and Heather Gathman (gathman@aisc.org) is a staff engineer, also in the AISC Steel Solutions Center. Bo Dowsnell, principal with ARC International, LLC, is a consultant to AISC.

steel quiz

This month's quiz is all about AISC Design Guide 10: *Erection Bracing of Low-Rise Structural Steel Buildings*. Order or download your copy today at aisc.org/dg.

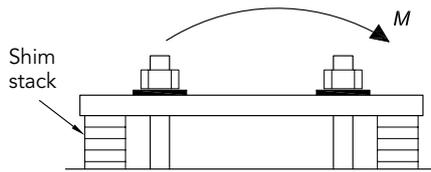


Fig. 1. Base plate with shim stacks subject to moment, M .

- 1 **True or False:** The structural engineer of record is responsible for the means, methods, and safety of erection of the structural steel frame.
- 2 **True or False:** During erection, a cantilevered column may remain in the free-standing position as long as its axial load capacity exceeds the temporary loading requirements and it is anchored with at least four anchor rods.
- 3 For the base plate with shim stacks shown in Figure 1, the lever arm is typically taken as which of the following to evaluate the overturning resistance of the column base during erection?

- a. The center-to-center distance between the anchor rods.
- b. The center-to-center distance between the shim stacks.
- c. The distance from the center of the left shim stack to the center of the right anchor rod.
- d. The distance from the center of the left anchor rod to the center of the right shim stack.

- 4 **True or False:** For a surface “deadman” constructed as a mass on top of the ground, the resistance to sliding is equal to the total weight of the deadman multiplied by the coefficient of friction between the deadman and the soil.
- 5 **True or False:** The members connecting the tops of columns during erection are referred to as tie members.
- 6 **True or False:** In the erection of low-rise structural steel buildings, temporary diagonal struts that carry both tension and compression are frequently used as support during construction.
- 7 **True or False:** Prescriptive requirements can be used to eliminate the need for calculations when determining the temporary support required.

TURN TO PAGE 12 FOR ANSWERS



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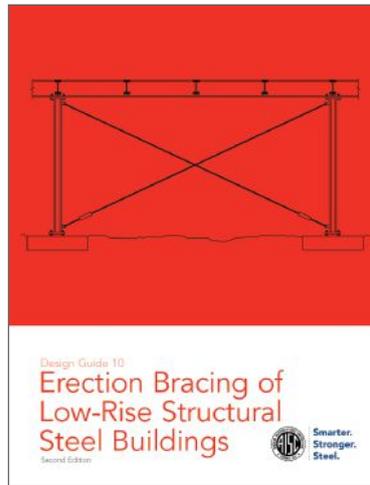


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Answers reference AISC Design Guide 10: *Erection Bracing of Low-Rise Structural Steel Buildings*.

- 1 **False.** The Design Guide's introduction references the AISC *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22), where, in Section 1.10.1, it states that the erector is responsible for the means, methods, and safety of the erection of the structural steel frame (Chapter 1).
- 2 **False.** Cantilevered columns should never be left in the free-standing position unless it has been determined that they have the required stability to resist imposed erection and wind loads. After the crane hook is released from a column and before it is otherwise braced, its resistance to overturning is dependent on the strength of the column base and the overturning resistance of the foundation system. It is essential to evaluate the overturning resistance of cantilevered columns (Section 3.2).
- 3 **d.** It is important to evaluate the overturning resistance of unbraced cantilevered steel columns—supported only by their base and foundation—to ensure stability after the crane hook is released during erection. Shim stacks may be used during erection to transfer the column base reaction to the foundation prior to the installation of grout. When shims or washer stacks are used, the compressive components of the column base reaction are carried by the shims, and the tensile and shear components are carried by the anchor rods. When subject to a moment, the lever arm is typically taken as the distance from the anchor rods in tension to the center of the shim stack in compression (Section 3.2).



- 4 **False.** The resistance to sliding is equal to the total weight of the deadman less the upward force from the bracing wire rope, multiplied by the coefficient of friction between the deadman and the soil. A deadman is a temporary anchor point used to secure wire rope bracing. The simplest form of one is typically a block of concrete sitting on top of the ground surface. The anchor resistance provided by a surface deadman is dependent upon the angle that the bracing wire rope makes with the deadman and the location of the bracing wire rope attachment relative to the center of gravity of the deadman. As the angle of the bracing from the horizontal becomes greater, the resistance of the deadman to horizontal sliding reduces (Section 4.3).
- 5 **True.** As the name implies, tie members tie the erected columns together. They can serve to transfer lateral loads from one bay to the next. Their function is to transfer loads acting on the partially erected frame to the vertical bracing in a

given bay. Tie members also transfer erection loads from column to column during plumbing operations. Typical tie members are wide-flange beams, steel joists, and joist girders. See Section 3.4 for more information on the design of tie members.

- 6 **False.** Temporary diagonal struts that carry both tension and compression or just compression are rarely used as part of the support system during construction. The purpose of the temporary support system is to adequately transfer loads, such as erection forces and wind loads, to the ground from their source in the frame. Wire rope, which only resists tensile forces, is often used to provide temporary lateral bracing during the construction of low-rise structural steel buildings (Section 4.1).
- 7 **True.** Design Guide 10 is intended to be used to determine the requirements for temporary supports to resist lateral forces—that is, stability and wind. Chapters 2 through 4 present methods by which the temporary supports may be determined by calculation of loads and resistance. Chapter 5 presents a series of prescriptive requirements, which, if followed, eliminate the need to use the calculation methods presented in Chapters 2, 3, and 4. The prescriptive requirements include those related to permanent construction, such as bay size, frame layout, anchor rod characteristics, and foundation details, as well as requirements for temporary bracing, including minimum requirements for the erection sequence and the installation of temporary bracing.

Everyone is welcome to submit questions and answers for the Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or solutions@aisc.org.



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Resources for a Seismic Boost

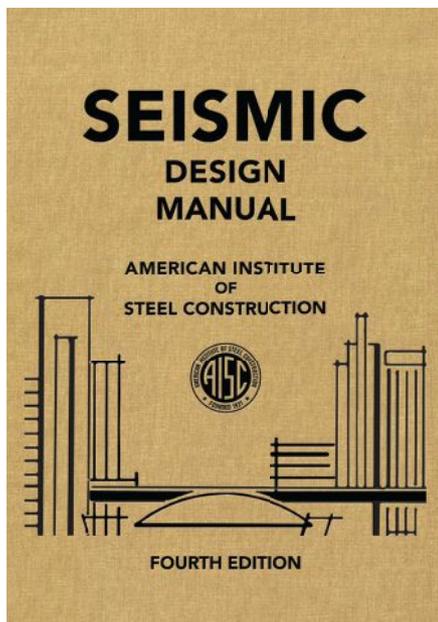
BY PATRICK ENGEL

Five helpful resources you might not know about in the 4th Edition

AISC Seismic Design Manual from the people who developed it.

THE 4TH EDITION *AISC Seismic Design Manual*, released in 2024, is the most exhaustive resource around for steel seismic design considerations. Navigating its 2,000-plus pages to discover all its offerings, though, would be an exhausting chore. The *Seismic Manual's* clean organization and table of contents help keep frustrating searches to a minimum, but opening it to hunt for a specific item each time you use it means you might miss some of its other offerings.

That might mean some *Seismic Manual* users don't know what they're missing. *Modern Steel Construction* asked several members of AISC Subcommittee M3—which writes and determines the *Seismic Manual's* content—and other AISC committee members involved in its production to help fill those gaps. They provided five *Seismic Manual* resources you might not know about or might apply beyond seismic projects.



Demystifying with Design Tables

One goal I had when I accepted the role as chair of the AISC Committee on Manuals was to find a way of demystifying seismic design for those who don't work in that environment day in and day out. The 4th Edition *Seismic Manual* Part 1 helps that goal.

Part 1 starts with text covering applicable specification, codes, and standards. It then walks through a narrative on seismic design overview and design considerations, provides some SFRS (seismic force-resisting system) elements and sample connections, and then finishes with several design tables intended to simplify the work and calculations necessary in seismic design.

If you take the time to read through the 23 pages in Section 1.3 “Seismic Design Overview and Design Considerations,” you will ground yourself in a basic understanding of the goal of seismic design.

The most helpful piece of Part 1 is its 13 design tables. All these tables are intended to help as you work through the design of elements and connections. Table 1-10, AISC Seismic Provisions Requirements for Seismic Force-Resisting Systems, is an overview of the applicable requirements of the AISC *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341-22, download or purchase at aisc.org/specifications). The nine pages of Table 1-10 will give you the road map you will need to follow to meet these requirements.

So, to understand what the *Seismic Manual* can do for you, read through Part 1 and then become familiar with Table 1-10. You will find the time you invest will be well worth your while.

—Mark Holland, PE, chair of the AISC Committee on Manuals

Like Mark, I think Table 1-10 is a particularly helpful and thorough resource. For each SFRS, the table's entries illustrate how requirements from the *Seismic Provisions'* general and system-specific chapters apply.

While nothing can replace reading the actual provisions, structural engineers tackling a SFRS for the first time will appreciate how Table 1-10 highlights essential requirements. Designers working under tight deadlines will realize how the table helps them avoid overlooking key requirements. The tabular format allows designers to easily compare the differences between systems, simplifying the process of evaluating alternatives.

—Tom Sabol, SE, PhD, chair of AISC Task Committee 9 (seismic systems)

Diaphragm Calculations

Seismic Manual Part 8 addresses diaphragms, collectors, and chords for a building or similar structure. Within that, it examines flexural, semi-rigid, and rigid behavior of the diaphragms, plus a design example that includes calculations of the seismic base shear. Example 8.4.1 (starting on page 8-10) includes the design of the diaphragm chords and checks the strength of the collectors.

This is a cool and important resource because it applies beyond seismic design considerations. Calculating diaphragm shears, chord member forces, and collectors for structures not in high-seismic areas, such as tall buildings with wind considerations, would follow similar principles. I worked on some major structures in Arizona, which is not a high-seismic region, that still used these calculations. They might be useful for your next project, whether it's in a high-seismic region or not.

—Tim Fraser, PE, AISC subcommittee M3 member

Widely Applicable Connection Design

The *Seismic Manual* is an excellent resource for connection design, even if you are not designing for seismic effects. One helpful connection tool is Example 5.2.4, which demonstrates the intricacies of designing a bracing connection where a wide-flange brace intersects at a beam-to-column connection.

The example is thorough and includes applying load combinations, analyzing

each component, and checking every possible limit state. Connection design can be intimidating, and this example methodically goes through the steps by breaking the connection down into components and tackling each individually: Brace-to-gusset connection, brace strength, using uniform force method to get interface forces, gusset-to-beam connection, beam-to-column connection, and gusset-to-column connection. Even though the loads come from seismic effects, the design process and steps

for this ordinary concentrically braced frame (OCBF) connection are applicable to any braced frame connection regardless of the type of loads.

Also, because of its thoroughness, it is a great learning tool for engineers who are learning about connection design. At the end of the example, there is a well-drawn detail of the connection with all the design information, which further gives the reader a tool and confidence to do their own braced frame connection design.

—Matt Eatherton, SE, PhD, AISC subcommittee M3 member

Collector Compression Limit States

If you ask your favorite chatbot how to determine the unbraced length of a steel collector beam, you will probably get a polite response about lateral-torsional buckling, but nothing about the various compression limit states that apply. Thankfully, there's Table 8-1 in the *Seismic Manual*. This table takes up just half a page, but it has important information on unbraced lengths for the compression limit states of flexural buckling about both axes, torsional buckling, and constrained-axis torsional buckling, each of which may have a different unbraced length.

Table 8-1 also serves as a useful reminder of the applicable compression limit states. The *Seismic Manual* is a guide, not a standard, and engineers can use other methods to determine unbraced lengths. Where Table 8-1 refers to "between brace points," Appendix 6 of the AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-22, download at aisc.org/specifications) should be used to verify what qualifies as a brace.

As Tim Fraser mentioned, Example 8.4.1 shows the design of a chord and a collector and makes use of Table 8-1 in practice, showing that constrained-axis torsional buckling governs over major-axis flexural buckling. It also has useful FBDs and a discussion of minimum diaphragm forces and chord forces.

—Leigh Arber, PE, Seismic Manual contributor

Collector Compression Capacity

Many engineers default to simplistic (and hopefully conservative) procedures

Condition		Major Axis Flexural Buckling Length	Minor Axis Flexural Buckling Length	Constrained-Axis Torsional Buckling Length	Torsional Buckling Length
Steel deck	Ribs parallel to beam	Full length	Between lateral brace points	Not applicable	Between torsional brace points
	Ribs perpendicular to beam	Full length	Not applicable (continuously braced)	Between torsional brace points	Not applicable
Composite deck or slab		Full length	Not applicable (continuously braced)	Between torsional brace points ^[1]	Not applicable ^[1]
Horizontal diagonal bracing		Full length	Between lateral brace points	Not applicable (if braced at centroid)	Between torsional brace points

^[1]The composite deck or slab provides some continuous torsional bracing. In some cases, this torsional bracing is sufficient to preclude constrained-axis torsional buckling. Methods for determining adequacy of such bracing are not presented in this Manual, and for simplicity these effects are not considered. See Helwig and Yura (1999) for guidance on evaluating continuous torsional bracing.

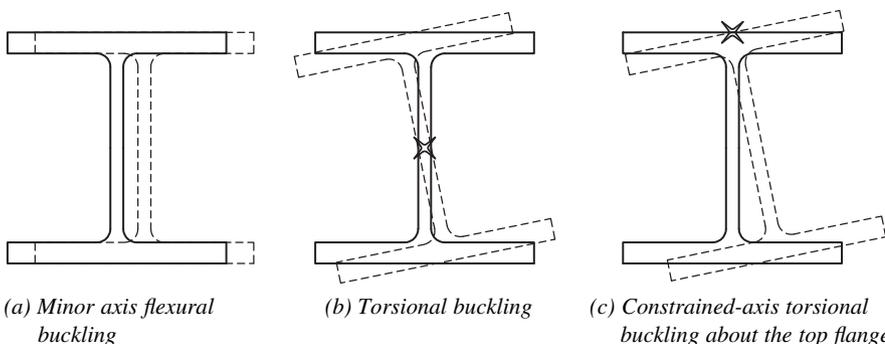


Fig. 8-3. Types of collector buckling.

$$F_e = \left[\frac{\pi^2 EI_y}{L_{cz}^2} \left(\frac{h_o^2}{4} + y_a^2 \right) + GJ \right] \frac{1}{A r_o^2} \quad (\text{Spec. Eq. E4-10})$$

when considering the compression capacity of steel collectors. Section 8.3 of the *Seismic Manual* provides a coherent and detailed presentation for properly considering the various buckling modes (shown in Figure 8-3), including constrained-axis torsional buckling, which can significantly increase the capacity over simpler methods. *Specification* Equation E4-10 is also included in Section 8.3 for determining the nominal stress, F_e , for constrained-axis torsional buckling.

As Leigh Arber noted, Table 8-1 in this section provides an excellent summary of how to establish the buckling lengths for the various buckling limit states (major axis flexural, minor axis flexural, torsional, and constrained-axis torsional) and restraint conditions. The section finishes with a step-by-step example (Example 8.4.1) to demonstrate how to complete the design for a typical collector design problem. I hope that engineers using the *Seismic Manual* will be sure to make their way back to this section and implement this approach, resulting in a more efficient and “correct” design. ■

—Jim Malley, SE, chair of the AISC Committee on Specifications



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Trained in Train Bridges

INTERVIEW BY GEOFF WEISENBERGER

Jaclyn Whelan has focused on railway bridges for her entire engineering career and recently led a task group that developed a vital new resource for designing them.

JACLYN WHELAN'S entry point into structural engineering grew into a specialty she enjoys. It has further bloomed into the chance to be a leading voice within a specific structural design segment.

Whelan, a project manager of design with Consolidated Rail Corporation (Conrail), has designed railway bridges since beginning her career at Jacobs and continuing it at AECOM and Conrail. Outside of structural projects, she recently chaired a committee that produced a much-needed new resource for steel railway bridges—and garnered AISC recognition for her contributions to it. She earned a 2025 AISC Special Achievement Award for her work in developing the *Guidelines for the Design of Steel Railroad Bridges for Constructability and Fabrication*, a joint publication from the American Railway Engineering and Maintenance-of-way Association (AREMA) and the National Steel Bridge Alliance (NSBA).

The publication was released in 2024 and is available for free at aisc.org/rbridges. It describes the special considerations for steel railroad bridges in design, girders, boxes, trusses, floor systems, decks, bolts, corrosion protection, and construction. It is intended for use with the AREMA *Manual for Railway Engineering*, Chapter 15—Steel Structures.

Whelan spoke with *Modern Steel Construction* about her career path, developing the *Guidelines*, and more.

Where are you from and where did you grow up?

I grew up about 45 minutes outside of Philadelphia and stayed in the region to pursue my undergraduate degree from Drexel University. I started working in railroad engineering right out of college, later pursuing my master's at Villanova University. Outside of a short stint living in Denver for a project assignment while working for Jacobs, I haven't lived anywhere other than the Philadelphia area.

What steered you toward the engineering path?

Growing up, I didn't have much interest in engineering. My dad is an auto mechanic, so I saw a lot of engineering-related things from him by watching him build things and work on cars in the garage. That was an awesome experience to have. During my junior year of high school, I attended a Society of Women Engineers event at Widener University near Philadelphia to introduce young women to engineering. That's where I seriously thought of engineering as a career option.

I originally wanted to be a dance major, but my parents told me to try again when I mentioned that plan, so I decided engineering would be the next best choice. I started at Drexel as an undecided engineering major. After my freshman year, I chose to focus on civil engineering. By my junior year, I decided to specialize in structures, which was also the subject of my master's.

What went into your work on the AREMA/NSBA task group and developing the *Guidelines*?

I have been part of AREMA Committee 15, Steel Structures for many years. In 2019, Ronnie Medlock, High Steel Structures' vice president of technical services (and the 2025 AISC T.R. Higgins Lecturer), approached me about possibly chairing a group to develop the *Guidelines*. After some internal debate, I ultimately decided to go for it.

Through Committee 15, we assembled a group of volunteers to develop it. We created and wrote the publication from scratch, so to speak. We weren't updating a previous version. We had 27 people in the volunteer group—educators, engineers, consultants, fabricators, and contractors—who helped develop the *Guidelines*. The intent is to help introduce people to the railroad industry and steel design for railroads, because it's different from AASHTO. You can't take things from AASHTO and bring them to the railroad industry.

Has railroad bridge design been your career specialty?

Very much so. It has been my niche even before I took my current job at Conrail in 2021. I have never worked on a highway bridge during my career as a consultant. I have mainly worked on railroad bridges in the U.S. and did some railroad structures work in Mexico. It's my wheelhouse.

What's the best advice you have ever received, personally or professionally?

So many people have helped me throughout my career, whether they have been mentors, sponsors, or champions. They have helped guide me as I've worked through challenges or celebrated amazing things that have happened.

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Whelan (center) with AISC President Charles J. Carter (left) and former AISC Board of Directors chair Hugh McCaffrey.



A lesson I learned from my mentors is that there is never one right answer for something, but there is the best answer for what's in front of you. Obviously, hindsight is always 20/20, but we're all trying to make the best decision based on available information. Another thing I've learned from mentors is that it's important to give back to others and pay it forward. I always try to think about the people I can mentor to help future generations in the industry.

What do you enjoy most about living in the Philadelphia area?

I love the proximity to everything. First, Philadelphia has a wonderful culture. There is always something to do, such as visiting the Independence Hall area, the museum district, and Avenue of the Arts, to name a few things. But it's also close to so many other locations, such as the beach—or the shore, as we like to call it. The mountains are a short drive. If you want to do a day trip to New York City to see a Broadway show or eat some great food, that's a two-hour train ride. If you want to go to Washington to see the cherry blossoms, that's a two-hour train ride.

You mentioned dance earlier. Where did that interest come from, and is it a lifelong interest?

I started dancing when I was in kindergarten. In middle school, I joined the dance competition team. I really enjoyed it as a break from school. In college, I was part of Drexel's dance ensemble group and was lucky enough to be on a dance scholarship for a few years. One piece of advice I always give students is to have a hobby outside of their major. That way, your brain can get a break.

I picked up another artistic outlet more recently. Unfortunately, my grandmother passed away during the COVID-19 pandemic. One thing that came out of that time was I inherited her 1961 Kenmore sewing machine and started quilting.

What goes into quilting and how long does making a quilt normally take?

The time varies. I make quilts for family and friends when they have a baby. I can get one of those done in about six hours, but my daughter's quilt

has been in the works for a year and a half now, and it's still not done. I told myself I would have it done by her first birthday, now I'm hoping I can finish it by her second. I did make her a little one before she was born, so she has one homemade quilt, but her bigger one is still in the works. ■

This interview was excerpted from my conversation with Jaclyn. To hear more, listen to the October Field Notes podcast at Apple Podcasts, modernsteel.com/podcasts, or Spotify.



Geoff Weisenberger ([weisenberger@aisc.org](https://www.weisenberger@aisc.org)) is the editor and publisher of *Modern Steel Construction*.

A Buffet(t) of Business Wisdom

BY JOHN SCHUEPBACH

These six business practices and lessons from Warren Buffett are applicable to any company, including steel fabricators.

WHEN 94-YEAR-OLD WARREN BUFFETT steps aside as Berkshire Hathaway CEO at the end of the year, he and lifelong business partner Charlie Munger will leave a legacy of good, ethical business practices. Steel fabricators' business and day-to-day operations have little in common with a major holdings company like Berkshire Hathaway, but they can still incorporate Buffett's universally applicable practices and lessons. Here are six worth applying.

Economic Moats

Buffett speaks at length about economic moats, such as building a business with a durable competitive advantage. In a highly competitive market such as steel fabrication, economic moats are extraordinarily hard to create and may even seem impossible. What can you do? Focus intently on building relationships with your customers. Focus on efforts to build a business that prides itself on superior service, reputation, ability to meet commitments, and a robust balance sheet.

The closest thing to building an economic moat is having high-quality, meaningful customer relationships. Your business is not transactional. You work with customers for months and sometimes years per project. If your price is within their budget or can be qualified as the best value, you'll have a fair chance at being awarded the next project. Properly built relationships will provide an adequate return on investment.

Operational Efficiencies

Buffett often discusses operational efficiencies with strong returns on capital without excessive reinvestment, which applies to fabrication companies in a few ways. Fabricators should understand their work is a capital expenditure (CapEx) intensive business. For a business to grow,

it must make CapEx investments. The right CapEx will propel it forward, providing the appropriate return on investment (ROI). The wrong investments will be an ROI drag. Base your investment decisions on reasonable, conservative utilization projections. It is easy to justify an investment in a spreadsheet with some small tweaks in the numbers, but if those numbers aren't realistic, you're only setting yourself up for poor returns on your capital.

Preventative maintenance matters. Fabricators that take care of their equipment and invest in preventative maintenance programs almost universally earn a higher ROI on their CapEx investments, because those investments stay in service longer. That equipment has a higher "up" time and performs well for its full life cycle.

Next, think about how to control costs. I like to break apart the overhead needed to run the plant and the overhead needed to run the company. I suggest that one person be responsible for each general ledger account. If your shop supplies or safety supplies are abnormally high, seek out a person willing to manage that account. Many suppliers will provide vending machines for your shop supplies that allow you to track who uses what items. Control your costs and eliminate waste.

Strong Management

Buffett invests in companies with strong management teams. Fabrication companies are management-intensive and require honest, competent leadership to propel the business. Management teams need to understand the business from the ground up and need to understand the financial impact of decisions. The best teams are well-rounded and have a high level of understanding of accounting, finance, project management, production, and installation (even though fabrication is the main service).

Successful fabrication companies require timely production, financial information, and management's ability to act on new information quickly. The sooner you can spot developments, nonconformances, or deviations from the plan, the more likely you will be successful in bringing about a successful outcome. Empower decision-making throughout the organization and encourage your team to speak up with new ideas.

Cash is King

Buffett values companies that generate consistent free cash flow. Consistency in construction is almost paradoxical due to the market's volatility, but it's still possible to create in other ways. First, while cash in a business is a drag on return on investment capital, cash in the company is the antidote to volatility. Construction companies require a large amount of working capital to finance projects and must maintain a decent cash flow while waiting to be paid. Retaining cash and building a huge cash reserve reduces the risk of getting knocked out. Can you recall a time when your customer didn't get paid on a project, but your contract is pay-when-paid? With enough cash, you can weather any adverse circumstances you face.

There is also a psychological impact when a business has a fortress balance sheet and is not overleveraged. Overleveraged companies tend to take more risk at a lower risk premium (profit margin) than those with strong balance sheets. Another paradox is that profit-starved companies build their balance sheets by taking on risky projects at low margins because they need the work. The need is desperate enough that they will take risks that are more likely to knock them out of the game permanently.



Long-Term Thinking

Buffett was an impressive long-term thinker, which goes hand-in-hand with steel fabricating. Fabrication companies should think in terms of decades, not months and years. Short-term thinking, such as manipulating work-in-progress reports, will often lead to trouble. Be honest with yourself and your partners. Relationships with trade partners and customers take years to build but can be instantly destroyed. Think long-term and build a business based on sustainability. Invest in people, invest in well-constructed CapEx plans that automate, and increase throughput with high long-term ROI.

Stick to What You Know

In 1996, Buffett's letter to shareholders described his key to success: "circle of competence." It may be his most important principle. His letter read:

"What an investor needs is the ability to correctly evaluate selected businesses.

Note the word 'selected': You don't have to be an expert on every company, or even many. You only have to be able to evaluate companies within your circle of competence. The size of that circle is not very important; knowing its boundaries, however, is vital."

While Buffett is applying the principle to investing, I think it's also applicable to projects. Understand what projects and work you can do profitably and what projects and work don't fit your capabilities. I have seen fabricators wade into trouble when they venture outside their circle of competence. You always need to try something new, but that does not mean betting the company's future on it. Avoid risks with the potential to knock you out of the game. Take a small risk and learn from it.

Legacy

Buffett and Munger are two of the greatest business minds of the last century. While they will be remembered for their

approach to investing, they revolutionized financial thinking with a long-term perspective. You can apply much of their wisdom in your own business for free with a library card and by watching their infamous past annual stockholder meetings on YouTube. ■



John Schuepbach

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Perfect Blend

BY MARK STEVENSON, SE, PE



A hybrid steel-CLT structural system conquers complicated connection considerations in a new vocational training center.

A HYBRID STEEL-CLT SYSTEM delivered a bold, distinctive architectural vision for a new 162,000-sq.-ft vocational training center in Kalamazoo, Mich., with striking exposed steel elements and connections that helped achieve several tricky fire code requirements.

The Kalamazoo Regional Educational Service Agency (KRESA) opened in May 2025 and offers programs focused on developing practical career-oriented skills for post-secondary students. They include courses in auto mechanics, construction management, robotics, medical technology, culinary skills, agriculture, advanced machining, and fabrication.

The project design team was presented with several specific design goals for the building: provide an architecturally sophisticated and distinctive look, incorporate sustainable construction practices, and provide a learning environment that's technically advanced and inspiring. A full mass timber design was considered as a low embodied-carbon solution. But a deeper dive into structural material evaluation considered the embodied carbon life cycle, material and fabrication costs, material availability, delivery times, and the qualified labor pool, all of which made a hybrid steel-masonry-CLT the best choice. Structural steel's sustainability benefits were also a positive in sustainability evaluations.

SUSTAINABILITY FEATURE STORY



Four round HSS X-columns, two inside and two outside, are one of KRESA's signature elements.

Lesley Michelle/KRESA

Several design components were suited for steel. A steel gravity frame offered quick fabrication and site erection timelines along with geometric flexibility to accommodate the required curves and angles of the building. Steel braced frames added lateral resistance where masonry shear walls would interfere with program requirements and fenestration, providing extra design flexibility. Steel HSS columns were selected for vertical support because of their finished look and the ability to connect to all faces easily, simplifying connection design. The columns are mainly HSS8×8, with smaller HSS5×5 columns used in one-story applications.

Composite wide-flange beams were used for the floor framing. Roof framing proved challenging, and numerous beams with cantilevers up to 18 ft required members up to W36×160. The five-ply 6 $\frac{7}{8}$ -in. CLT panels chosen allowed for 21- to 22-ft roof spans, so a predominant grid spacing of approximately 21 ft by 37 ft was used. Girders in the regular areas of the roof were W24×55, and W14×22 beams typically spanned parallel to the CLT strength axis.

A system of diagonally oriented glu-lam beams supplemented the CLT spans at the high-roofed atrium and clerestory areas. These beams were included partially as an architectural element, but also provided crucial added flexural capacity to the heavily loaded mechanical area on the roof. The clustered equipment, along with accumulating snow drifts, required these portions of the roof to support a combined dead plus snow load of 90 psf.

Using CLT diaphragms for roof and floor decks was initially considered. The aggressive design schedule and concerns about construction sequencing, though, ultimately led the team to choose a conventional composite floor deck with composite steel beams and a CLT roof deck spanning between steel girders and glu-lam purlins.

The building lateral system uses steel braced frames and CMU shear walls. Lateral stability of the long, curved clerestory required cross-span steel pipe braces and HSS-to-HSS moment connections along its axis. Foundations are standard shallow spread footings.



Three bent plate girders cantilever 36 ft from their base and support five-ply CLT panels.

Lesley Michelle/KRESA

Fire Focus

A 1937 Michigan state law says structural elements of schools must be made of “fire-resisting material.” Steel, masonry, mass timber, and heavy timber in general meet the requirement, and steel has the advantage of being naturally non-combustible. Though wood is flammable, the properties and dimensions of a wood structural member can meet the requirements of non-combustible construction. A surface char layer forms and insulates the member core during a fire, protecting its residual capacity. This behavior has long been recognized by building codes in the Type IV heavy timber building classification, but mass timber was only recently included.

The design team showed by calculation that the proposed five-ply CLT deck panels retained sufficient strength after charring to qualify for the code-required one-hour fire exposure. This result persuaded the city council and building department to deem the CLT as fire-resistant and allow its use in the project.

Fire regulations also required that the building be separated into discrete fire compartments by two-hour separation walls. The design of these walls and the connections to them must ensure any building portion collapse does not structurally compromise the remainder of the building. The two typical approaches to fire compartments are building two structurally independent fire walls or a single common wall with fire-release detailing. The single-wall

option was chosen due to the required fire walls’ length and large 24-in. width of the double walls. That choice required all structural connections to release in a fire.

The fire-release connections required various details for connecting gravity and lateral members to the masonry separation walls using Fero Break-Away technology. Slotted seat angles are machined by Fero to provide about 1 kip of shear resistance parallel to the slot, but release when the nylon compression washer melts under fire conditions.

Steel beams could not be set in grouted masonry pockets as in typical construction, because their prying action under structural collapse would damage the wall. Instead, knife plates with horizontal release slots were used. Reactions up to 20 kips vertical shear combined with moment from connection eccentricity meant that surface-mounted fasteners were inadequate.

The solution was a steel box insert with two C7× verticals and ½-in. plates top, bottom, and each face. The top and bottom plates were provided with ½-in. shear studs to bond with fully grouted and reinforced CMU all around.

CLT panels to the fire wall connections used L6×4×⁵/₁₆ ledger angles with grooves machined by burn-off system supplier Fero Corporation. Bearing plates (³/₈-in. thick) were screwed to the bottom of the CLT planks and had welded threaded studs that engaged the ledger slots.

SUSTAINABILITY FEATURE STORY



KRESA opened in May and welcomed its first class of vocational training students this fall.

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Grids and Geometry

The building's asymmetrical, non-orthogonal geometry and the mix of structural systems presented a few vertical and lateral analysis hurdles. Four separate grid systems—three orthogonal and one radial—were used to lay out the project. Coordinating the common points and their relationships led to complex connection geometries, particularly in the main roof framing with its curved slot for the clerestory.

Because fire regulations made each portion of the building a standalone structure, the design team needed multiple analysis models. Loads and reactions had to be combined between these models to capture the full net action on the common wall elements. The non-orthogonal plan and vertical irregularities required full 3D models to capture the interactions.

One of the building's signature elements is its four round HSS X-columns, two interior and two exterior, which are exposed to view and came with several analysis challenges. Due to architectural requirements, each X-column has a slightly differing asymmetrical geometry, causing unbalanced reactions under gravity loading and a lean-on effect that must be accounted for in lateral system design. These columns also contribute to overall lateral load resistance, but the stiffer walls and braced frames limit the magnitude of reaction at the X-columns.

Out in the Open

The exposed steel and wood components are featured in a variety of ways, and architecturally exposed structural steel (AESS) was

specified for the most visible members. Steel shapes are visible at distances between arm's length and more than 40 feet. To limit AESS fabrication costs, only members and connections within 10 ft to 15 ft of view were specific to an AESS category.

The center joints of the X-columns were specified as Level 4 AESS (showcase elements), requiring full blending of the welds to create a smooth transition between sections. Connection analysis was based on the provisions of the AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360) Chapter K for branch and chord design of round members. The HSS column thickness was initially set to $\frac{3}{8}$ in., but connection design showed the columns would need internal stiffeners that are difficult to fabricate for HSS. Increasing the column thickness to $\frac{1}{2}$ -in. eliminated the need for stiffeners.

Level 3 AESS detailing was also specified for exposed brace frames and the signature cantilevered entry canopy. The entry canopy has three bent plate girders with tapered profiles that cantilever 36 ft from their bases and support five-ply CLT panels. The CLT panels span 20 ft on center between the bents and cantilever 10 ft past each end.

The overall design was controlled by the design snow drift at the face of the building, which tapered from 70 psf to the flat roof load of 25 psf. The canopy is stabilized by 4-in.-diameter XXS steel pipe backspan braces with CJP-welded end plates to engage $1\frac{3}{4}$ -in. Grade 105 pin connections at each end. The large uplift at each backspan required six $1\frac{1}{2}$ -in. Grade 55 anchor rods tied to grade beams on 24-in. by 30-ft deep drilled piers.

Roof framing is a mix of CLT and steel members.



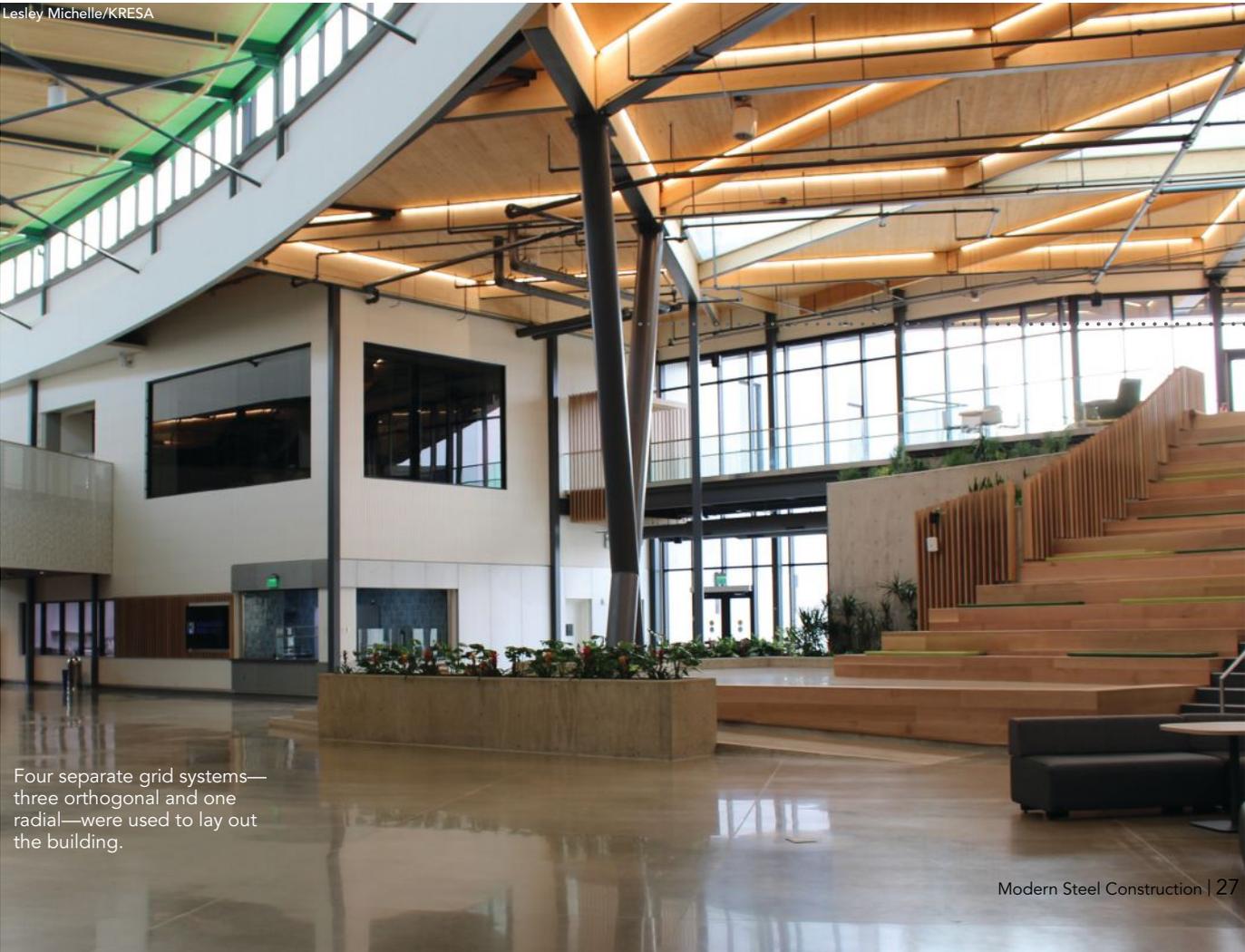
Precision Productions



SUSTAINABILITY FEATURE STORY

The X-columns were specified as Level 4 AESS, requiring full weld blending.

DLR Group



Lesley Michelle/KRESA

Four separate grid systems—three orthogonal and one radial—were used to lay out the building.



Steel HSS columns are the vertical support system and provide a clean finished look.

DLR Group

Panel Points

Typical CLT panel to wide-flange connections are most easily made by timber screws run up through top flange holes. To allow punching during fabrication, hole diameters should be a minimum of $\frac{3}{8}$ in. Beam depths less than 12 in. and flange widths less than 5 in. should be avoided due to installation and edge distance requirements.

CLT panels have very high in-plane shear strength and stiffness, so diaphragm design is controlled by the panel connections. The top of panel seams may have steel strap or plywood shear strips in routed slots for shear transfer. Chords and collectors may be formed by additional top-of-panel straps or by load transfer to the steel framing system. Where the steel frame acts in this capacity, beam-to-column and beam-to-shear-wall connections must be designed for combined vertical and axial loads. The spacing of panel screws to steel framing must also consider the controlling lateral forces.

Career Launch Pad

The training center gives students from Kalamazoo County's nine school districts the chance to learn skills that could one day help them be part of a similarly impressive building. Beginning this fall, the center will be a central component of developing the region's next wave of skilled trade workers. ■

For more about hybrid steel-CLT design, watch AISC's webinar at [aisc.org/hybrid-webinar](https://www.aisc.org/hybrid-webinar).

Owner

Kalamazoo Regional Educational Service Agency

Architects

DLR Group (design architect)
Wightman (architect of record)

General Contractor

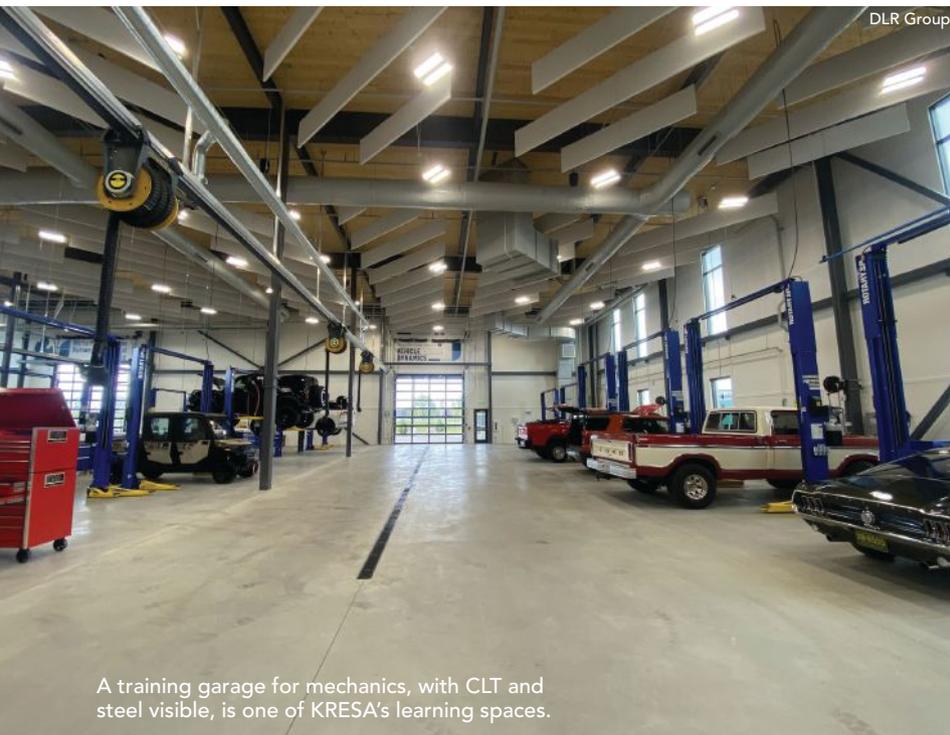
CSM Group

Structural Engineer

IMEG

Fabricator and Detailer

Van Dallen Steel 



DLR Group

A training garage for mechanics, with CLT and steel visible, is one of KRESA's learning spaces.



Mark Stevenson

(mark.b.stevenson@imegcorp.com)

is a senior associate at IMEG.



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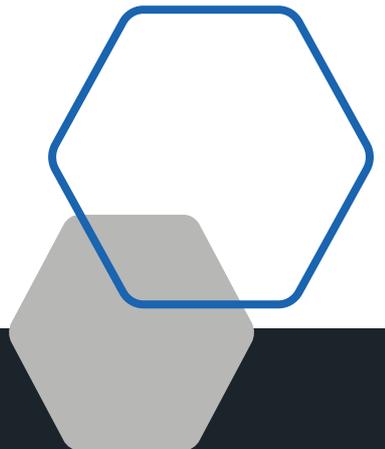
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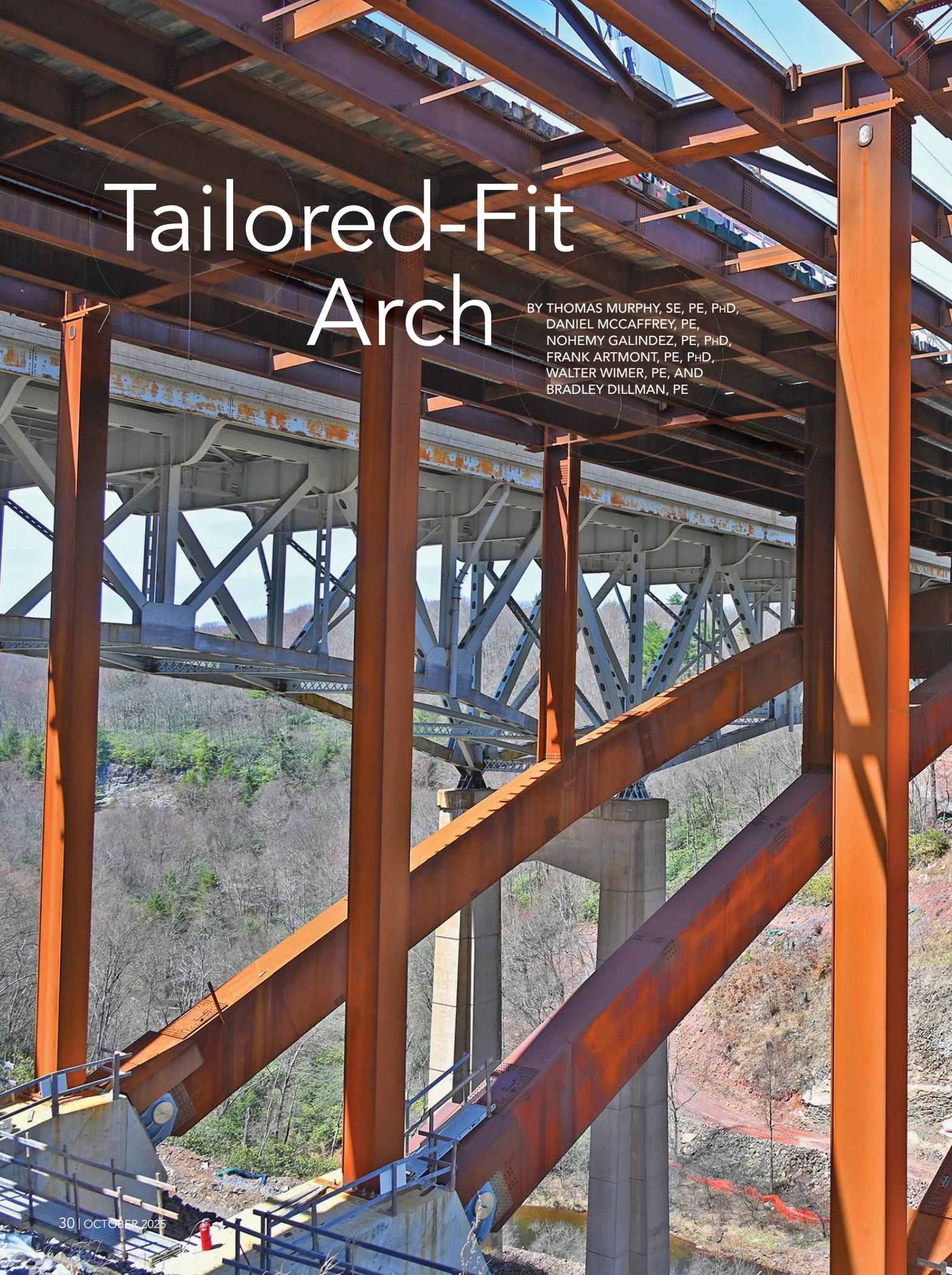
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Tailored-Fit Arch

BY THOMAS MURPHY, SE, PE, PHD,
DANIEL MCCAFFREY, PE,
NOHEMY GALINDEZ, PE, PHD,
FRANK ARTMONT, PE, PHD,
WALTER WIMER, PE, AND
BRADLEY DILLMAN, PE



A steel arch bridge in a state park meets aesthetic considerations and is built to withstand all conditions.

QUALITY FEATURE STORY

A NEW STEEL ARCH BRIDGE over a gorge in northeastern Pennsylvania preserves the surrounding area while adding a striking complementary visual that can accommodate future maintenance.

The bridge replaces the existing Interstate 476 crossing through Hickory Run State Park in the Pocono Mountains, which carries the highway over the greenery-filled gorge and Mud Run fishing stream. Named the Hawk Falls Bridge for a nearby waterfall and hiking area known for its rugged landscape, the original bridge was designed by Modjeski and Masters in the 1950s and has four lanes of traffic, a 4-ft median, and 3-ft outside shoulders.

When the Pennsylvania Turnpike Commission determined the original bridge was nearing the end of its useful life, it deemed a replacement on a new alignment immediately east of the existing as the most effective path forward. The new bridge needed to minimize disruptions to surroundings, handle current and future traffic needs, minimize long-term maintenance needs, and preserve the site's natural beauty.

The solution to achieve all of these requirements was a steel arch bridge founded high in the deep gorge's rock walls. The bridge needed to accommodate future widening, which led to three arch ribs in the new cross-section. To minimize the number of joints in the bridge, a continuous multi-girder superstructure was used from abutment to abutment, supported by columns founded in the rock or on the arch ribs.

The multi-girder superstructure also eliminated nonredundant steel tension member (NSTM) designation for floor system members. A series of floor beams carries the loads from the girders to the columns. The bridge uses 3,500 tons of structural steel, all of which is unpainted weathering steel that harmonizes with the site's natural color palette and requires paint only on the inside of the arch ribs.

.....

The new Hawk Falls bridge is 720 ft from abutment to abutment.

A rendering of the completed bridge.



Arch Activity

To minimize the footprint in the gorge, the arch ribs have a fairly high 7.6-to-1 span-to-rise ratio. This moved the skewback foundations of the arch up the gorge walls, maximizing the clear space under the bridge and opening up the views from the nearby Hawk Falls. The resulting span of the arches, which are pin-supported at their ends, is 465 ft and 7/8 in. The continuous multi-girder superstructure consists of 12 60-ft rolled steel girder spans for a 720-ft superstructure length bearing-to-bearing at the abutments. Independent footings support the first set of supporting columns from the abutments, and the arch foundations support the next set. Arch ribs support all remaining columns, which are a mix of W-shapes and box shapes, depending on height.

The arch ribs are welded stiffened steel boxes. The flanges have a single stiffener running the full length, while the webs have two stiffeners along their height. The rib dimensions are approximately 7 ft, 5 in. deep by 4 ft wide, with the exterior dimensions varying based on the thickness of the top flange and web plates. The box's 7-ft, 4 1/2-in. depth was determined by the applied loads and the requirement that an inspector can walk upright wearing a hard hat without bending down.

The arch shape was determined based on the funicular polygon of the applied dead load forces, using multiple arc segments to approximate the shape with smooth transitions at the column locations. The bottom flange is positioned between the webs, which continue down past the flange, providing a drip edge that effectively sheds rainwater. The interior of the arch ribs is painted for corrosion protection and to aid inspection, and drainage holes are provided in case of water ingress. Drip bars are provided to route any flow on top of the ribs to the sides and the bottom flange's underside. The ribs are equipped with an interior lighting system and ventilation fans to facilitate inspections.

Supportive Superstructure

Historically, arch bridges have used expansion joints in the deck system at the supporting columns. Expansion joints decoupled the behavior of the arch from that of the floor system but resulted in poor long-term durability, with roadway runoff leaking through the joints and causing corrosion in the floor system that supports the columns and arch ribs. A continuous superstructure from abutment to abutment, though, eliminates corrosion issues.

In addition, the multi-girder superstructure's stiffness contributes to the bridge's overall structural behavior by limiting deflections and sharing a portion of the bending moments with the arch ribs. An integral floor beam spans across the columns and supports the superstructure girders. The girders are spliced at the floor beam locations, with top and bottom flange tie plates passing over and under the floor beams, respectively, providing moment continuity. This arrangement allowed the floor beams to be classified as system redundant members based on the then-current specifications, avoiding the need for NSTM inspections.



The arch ribs' box section had to be large enough for an inspector to walk upright wearing a hardhat.

QUALITY FEATURE STORY

The floorbeams are classified as system redundant members.





The arch ribs were erected using cranes located behind the abutments.

Modjeski & Masters

Nancy Lenore, Photo Synthesis Photography

The bridge has 3,500 tons of unpainted weathering steel, which was chosen because of how it complements the surrounding area.



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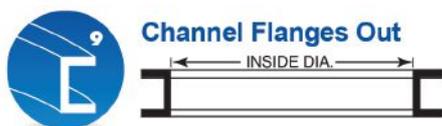
4 Flat Bar The Easy Way
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5 Square Bar
 18" Square

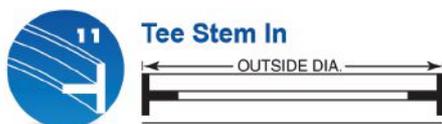
6 Beam The Easy Way (Y-Y Axis)
 44" x 335#,
36" x 925#

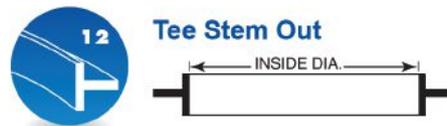
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 44" x 285#

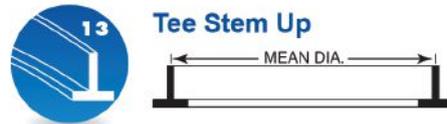
8 Channel Flanges In
 All Sizes

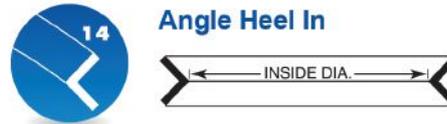
9 Channel Flanges Out
 All Sizes

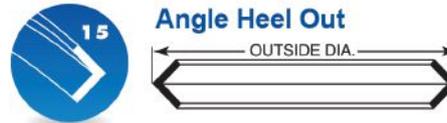
10 Channel The Hard Way (X-X Axis)
 All Sizes

11 Tee Stem In
 22" x 142¹/₂# Tee

12 Tee Stem Out We bend ALL sizes up to:
 22" x 142¹/₂# Tee

13 Tee Stem Up
 22" x 142¹/₂# Tee

14 Angle Heel In
 8" x 8" x 1" Angle

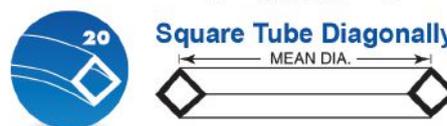
15 Angle Heel Out
 8" x 8" x 1" Angle

16 Angle Heel Up
 8" x 8"x1" Angle

17 Square Tube
 24" x 1/2" Tube

18 Rectangular Tube The Easy Way (Y-Y Axis)
 20" x 12" x 5/8" Tube

19 Rectangular Tube The Hard Way (X-X Axis)
 20" x 12" x 5/8" Tube

20 Square Tube Diagonally
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A continuous superstructure from abutment to abutment can be used as a major portion of the lateral load-resisting system. Top lateral bracing is provided in the multi-girder superstructure's exterior bays, and wind tongues are provided at the abutments to react to the lateral loads. At the crown of the arch, the floor system is supported directly on bearings on the top of the arch ribs. These bearings are fixed laterally, transferring lateral loads between the superstructure and the arch ribs.

Vierendeel bracing is used between the arch ribs, with two main struts at the crown of the arches and other struts positioned at the quarter points of the span on either side. The struts provide the necessary stability for the arch ribs during construction, when the superstructure provides no lateral support, and in the final condition. The system takes advantage of the closed box sections used for the arch ribs, which have significant out-of-plane bending stiffness. A Vierendeel system, as opposed to a truss-style bracing system, results in fewer system components and fewer locations for debris to collect and corrosion to initiate.

Prevention and Anticipation

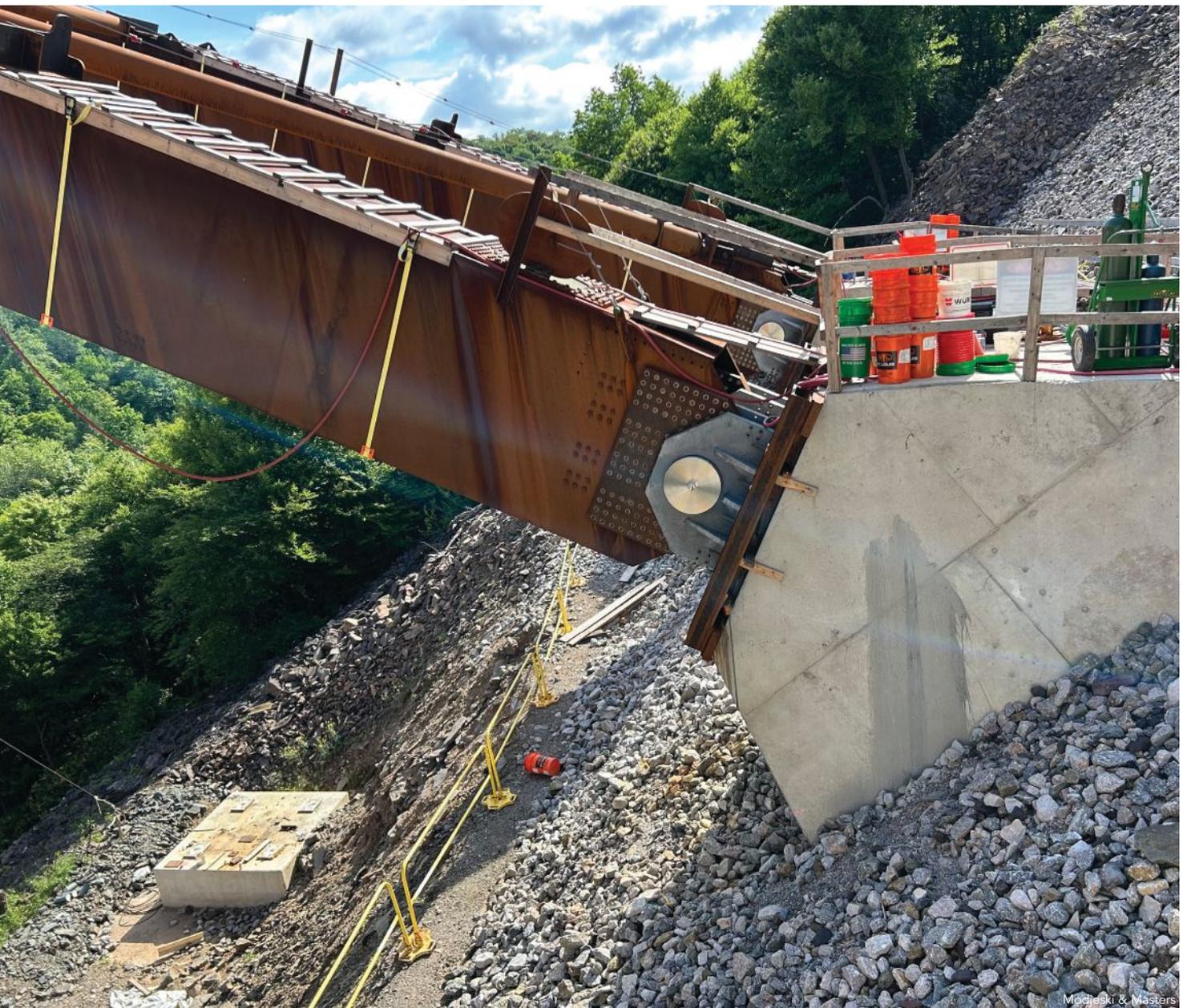
The bridge is designed as a two-hinged arch, and the arch rib bearings were detailed to allow for the resulting end rotations. The bearings consist of separate pins in each arch rib web, self-lubricated bronze bushings, and base assembly weldments to receive the arch thrust and transfer it to the skewback foundations. The pins are made of stainless steel and are supported by the rib webs and bolted pin plates.

The pin plates are made from ASTM A709 50CR, also known as ASTM A1010, a form of stainless steel chosen for its improved corrosion resistance. These are bolted onto the rib webs using stainless steel bolts. The base assembly that supports the pins was

The Vierendeel struts and arch rib field sections were assembled at High Steel Structures to confirm the geometry.



High Steel Structures



Modjeski & Masters

above: The arches are pin-supported at their ends.

right: The bearing assembly was line-bored.

.....

hot-dip galvanized after fabrication for corrosion resistance. This combination of materials was chosen due to the constrained geometry of the connection.

The concrete skewback foundations transfer the arch truss into the rock walls of the gorge. The skewbacks' slim stem supports the arch rib bearings and the columns supporting the superstructure. The stems transition into broad footings below ground, which reduces the bearing pressure on the supporting rock. The footings' undersides are stepped to provide friction and bearing resistance.

The new bridge design anticipated future widening, with the foundations, arch ribs, columns, and floor beams all sized for the self-weight and traffic loadings of a wider bridge carrying two additional lanes with shoulders. No strengthening will be needed for widening. Instead, extensions will be bolted to the ends of the current floor beams, which can carry additional stringers and deck.



Modjeski & Masters



Modjeski & Masters

The total arch span is just under 466 ft.

Large Laydown

To ensure accurate superstructure geometry and fit, High Steel Structures completed full laydown assembly of the three arch ribs with their respective columns. Control points along the arch ribs and at the top and the bottom of the columns were surveyed in the assemblies to verify the steel geometry, including the horizontal pin-to-pin length. Not only was each arch rib's geometry critical, but so were the relative geometries of the three arch ribs. The center rib's design camber differed from that of the exterior ribs, and the floor system geometry was ultimately controlled by the arch ribs' profile and the column lengths.

Other bridge components were also assembled at the fabrication shop to ensure proper geometry. These assemblies included the floor system with integral girder-floor beam connections and the Vierendeel struts with the mating arch rib field sections of the three arches. To ensure accurate geometry at the skewback bearings, the arch rib webs, pin plates, and the base assembly that receives the pins were line-bored by PK machine at the shop.

Laydown assemblies verified the steel geometry and were used to set the bolted connections' fit. Based on project needs, several methods of fabricating the bolted connections were used, including reaming in assembly, drilling from solid in assembly, drilling to



Thomas Murphy is a senior vice president and chief technical officer, **Daniel McCaffrey** is a senior project manager, and **Frank Artmont** and **Nohemy Galindez** are senior engineers, all at Modjeski & Masters. **Walter Wimer** is a senior engineer project manager for the Pennsylvania Turnpike Commission. **Bradley Dillman** is the vice president of engineering for High Steel Structures.

Temporary erection pins were part of the bridge design to ensure the correct stress state is induced.

Modjeski & Masters

a template, and drilling full-size holes in unassembled pieces with CNC equipment. Each technique was selected considering the connection complexity and geometry, and above all, what was most appropriate with current fabrication technology to ensure satisfactory fit and geometry of the completed structure.

The arches were designed with temporary erection pins to ensure the correct stress state is induced in the statically indeterminate structure under steel-only loads. Because the forces in the center arch rib are different than those in the exterior ribs, the locations of the temporary erection pins along the web height were varied to match the desired locked-in moments.

Tower Tactics

Construction began in 2022, with Trumbull as the general contractor, Genesis Structures as the erection engineer, and STV as the construction manager/inspector. The designer's assumed erection sequence envisioned cantilever tie-back construction using a stay cable system and temporary towers.

Trumbull, though, used falsework towers to support the arch during erection, which provided more positive geometry control. The steel arch ribs were erected from cranes located behind the abutment. The high pick weights and reach required Liebherr LR 11000 cranes, which have a 1,200-ton maximum load capacity, a 722-ft maximum hoist height, and a 603-ft maximum radius.

The bridge will begin carrying traffic in fall 2025, while additional project work, including staged construction of an overpass bridge to the north, is finished in fall 2026. ■

Owner

Pennsylvania Turnpike Commission

Structural Engineer

Modjeski and Masters

General Contractor

Trumbull

Erection Engineer

Genesis Structures

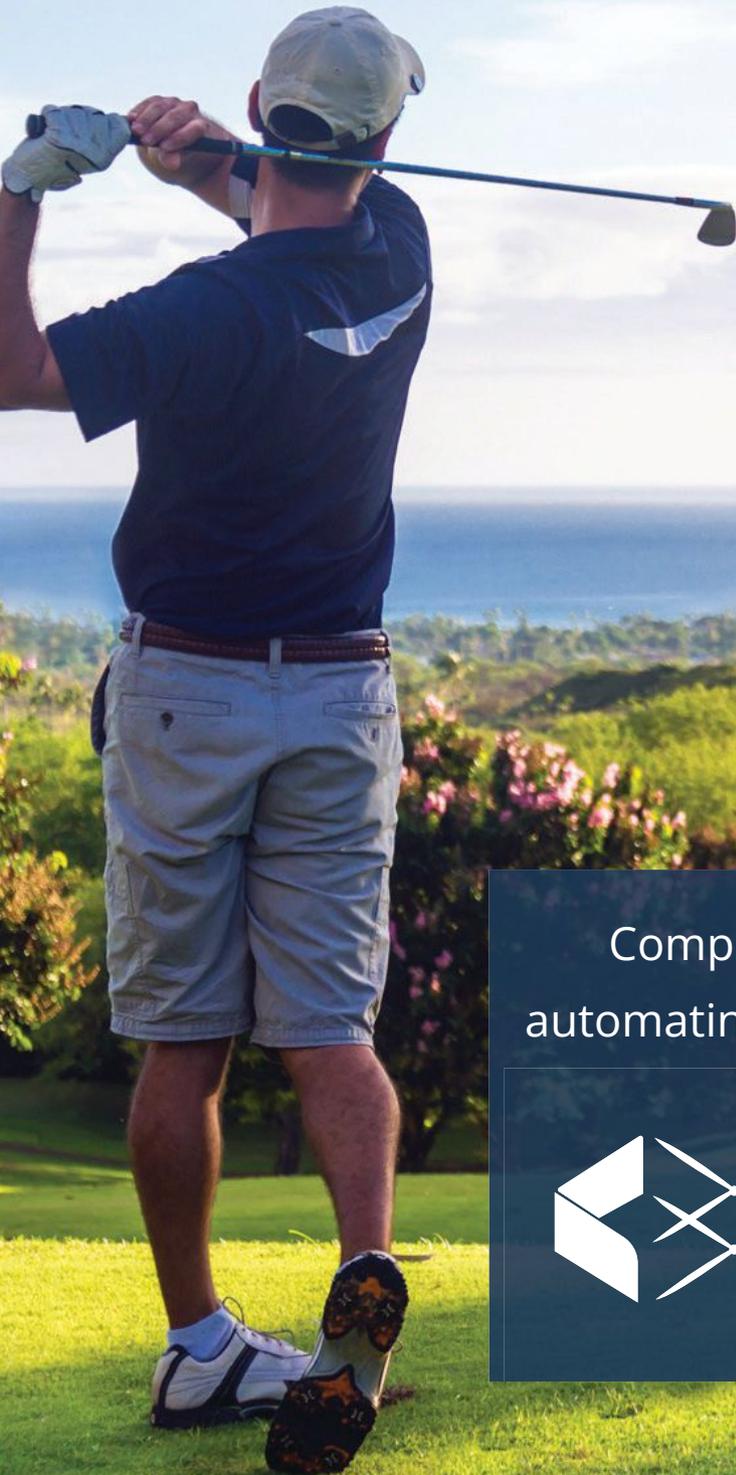
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Above and Beyond

BY PATRICK ENGEL

Four students built a steel bridge over a creek in Costa Rica for their senior design project, easing a community's travels and learning beyond the classroom.

STEEL BRIDGE SUPERSTRUCTURE DESIGN has seemingly endless permutations, each driven by a site and logistical conditions list that rarely matches a prior project. Jobsite limitations, seismic rules, and rivers that must not be disturbed—among many other factors—influence design and, by extension, material choice.

Four Vanderbilt University students, prompted by an admirably ambitious senior design class project choice, encountered a condition list that's surely a first: designing a bridge with members that could fit into Southwest Airlines checked luggage, be transported to an international jobsite, and be assembled in a day with portable (and TSA-friendly) tools.

Even if any prior bridge was transported via commercial flight to its foreign destination, the rest of the project is an undoubted novelty in bridge construction. The students were also the material transportation and construction crew. And the fabricators. And the material procurers. They began and completed every step within the 2024–25 academic year.

Since April, their 20-ft-long, 5-ft-wide bridge has provided a safer walking path over a creek in a small town near San José, Costa

Rica. It replaced an unstable makeshift crossing that was generously described as a bridge and was difficult for older community members to cross comfortably.

“It was made of something like trailer ramps stacked on some dirt and nailed into the ground with long pieces of rebar,” said Logan Glazier, one of the four students. “Sort of precariously held up.”

The bridge is in place because Glazier and fellow Vanderbilt 2025 civil engineering graduates Zachary Hodges, Winnie Huang, and Elise Puliafico turned a class assignment into a real-life project they oversaw from the first design meeting to the final bolt installation. They found the project and local construction partners through Maximo Nivel, a Latin America-based study abroad and educational travel organization. They had two bridge engineer advisers, John Hastings from HDR and Scott Wilson from Palmer Engineering. But this was their idea, their undertaking, and their design.

“I've never seen a senior design class design, fabricate, and build a project that benefits a community or individual,” Hastings said. “This is rare.”

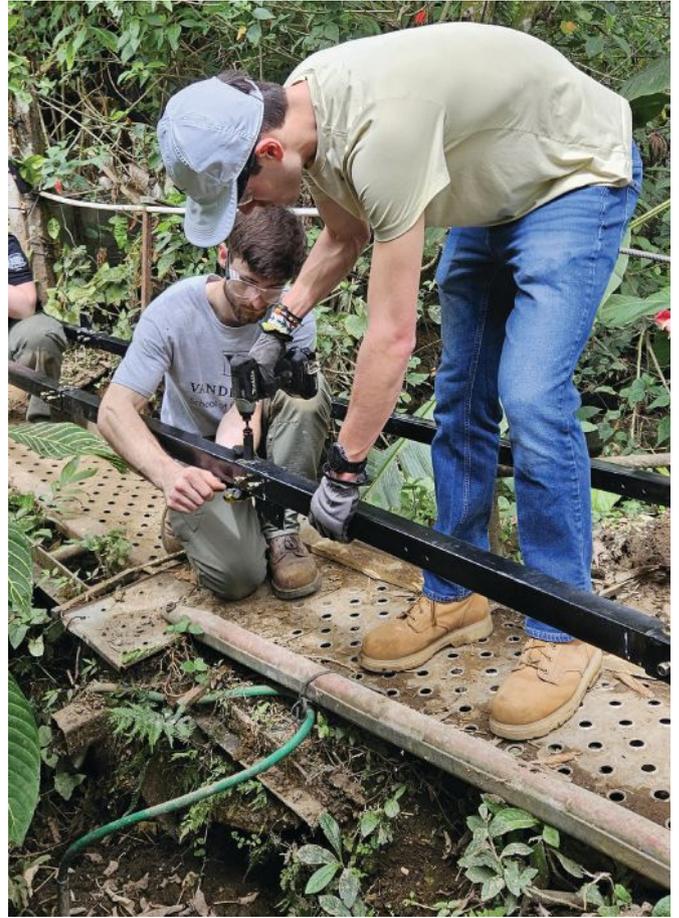
From left: Winnie Huang, Elise Puliafico, Logan Glazier and Zachary Hodges built a steel bridge in Costa Rica for a class project.



All photos courtesy of Vanderbilt University



The 20-ft-long bridge crosses a small creek.



above: The bridge replaced a feeble crossing.
left: The prior crossing was made of ramps, rebar and packed dirt.
below: One of the community members observed construction.



Structural design can become siloed without effort to avoid it. Design is done on paper and computer screens, and the understandable instinct to create the ideal model from an engineering standpoint can inadvertently omit its impact on project partners. Larger-picture consideration takes time to become second nature.

Involvement in every step, though, is a rarely available way to build instincts faster. It reveals the interconnectedness between all project phases and trades in a way classes or design-only project prompts can't. It's hard to imagine many structural engineering students have graduated with this much awareness of how trades rely on each other, how design impacts other phases, and how projects birth mid-design changes that test engineers' adaptability.

"You might be on the design or construction side, but you're not encompassing the whole project from end to end," Hastings said. "They did that."

Lessons from SSBC

Vanderbilt senior design courses require students to produce and present a design based on a real-world site's conditions. Like real-life projects, they have constraints, budgets, reviews, and deadlines. The end products are design processes, systems, prototypes, simulations, or virtual demonstrations presented at semester's end. Excel in those, and you'll earn an "A."

Glazier, Hodges, Huang, and Puliafico saw that as the bare minimum, though. They wanted to produce a bridge and put it to use—ideally internationally. When the fall 2024 semester began, they pitched the idea to their professor, Lori Troxel, who said she would help however possible if they could find a project on time.

Her initial guidance was to work with a reputable organization that would ensure the substructure was built in time and the bridge would be maintained after construction. The students researched organizations specializing in international construction projects and asked them about available projects.

Glazier reached out to Maximo Nivel via its website contact form and outlined their idea. Within a day, Maximo Nivel representative Tristen Jones replied and expressed interest, even though the organization had never worked directly with students on this kind of endeavor. One week later, Maximo Nivel pitched the Costa Rica project with urgency.

"It was crucial because the health of some people who live on one side was rapidly decreasing," Glazier said. "The older residents were also having trouble traversing the crossing."

The students' schedules and other endeavors—for instance, Hodges' NCAA Division I cross country team commitments—allowed for just one week in Costa Rica. That meant they could construct the superstructure on site, but everything else had to be done on campus in Nashville, just like another activity Glazier and Huang know well. They were on Vanderbilt's Student Steel Bridge Competition (SSBC) team in 2023 and 2024, helping design and fabricate a similarly sized steel bridge on campus that could be shipped and built at a competition site.

"What if we built a modular bridge at Vanderbilt like we did with SSBC, brought the steel superstructure, and did the rest of it down there?" Glazier said. "We all fell in love with this idea, presented it, and (Maximo Nivel) was all over it. We were off to the races in the fall designing our superstructure to be packed in checked luggage."



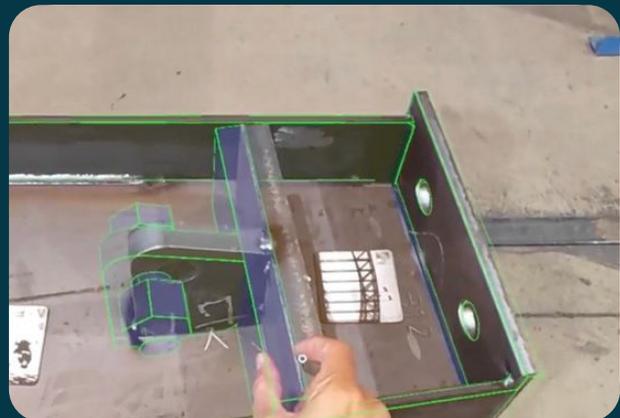
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The students fabricated the bridge members in Nashville before shipping them to Costa Rica.



Bridge members had to fit within Southwest Airlines' 62-in. length, width, and height limit for checked luggage.

All told, the students had about seven months from project approval in early September to construction in mid-April. It's a short time frame for any project. But it's about the same as SSBC, which was proof that it's doable. SSBC gives teams a real-life design prompt that comes with realistic constraints and makes team members consider fabrication and transportation in the design stage.

"There's the class knowledge of statics, structural analysis, and sizing members," Glazier said. "But SSBC is helpful with us having to fabricate it. How are we going to make these connections so we can fabricate them with the tools we have? How do we make sure we use repeatable member sizes so we're only making three fixtures instead of 30 for each member?"

Added Huang: "We used the same process (as SSBC) and applied it in a different way."

With SSBC as their framework, Glazier and Huang understood how and where to start, which can feel like the most daunting part of a project this ambitious. They had an outline and a plan. They had no trouble convincing Puliafico and Hodges that it was doable.

"It coincided closely with SSBC," Troxel said. "Winnie and Logan having that experience let them quickly jump in. If they didn't have that experience, there's no way this bridge would have been completed within a year."

Adapting and Anticipating

SSBC requires every tool and steel member to fit in a 42-in. by 6-in. by 4-in. box—not far off from Southwest's 62-in. length, width, and height limit for checked luggage. The SSBC limit is in place to make students consider transportation constraints that arise on real projects. Steel members must fit on flatbed trucks, clear tunnels and underpasses, make tight turns, or, in this small-scale case, fit inside luggage.

"They could have designed a beam that spans the whole bridge," Wilson said. "But you can't get that to Costa Rica."

The final design is a flat through truss bridge, with 16-gauge wall thickness hollow structural section (HSS) members at the top that double as a handrail. The bridge diagonals were flat bar with various thicknesses. The bridge has composite wood decking and a chain link fence, which were sourced in Costa Rica so they could

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be easily replaced when necessary. The HSS members had slotted connections. Every design decision was geared toward making assembly as straightforward and fast as possible.

“Instead of a gusset plate on each side, we had a single gusset plate and slotted the HSS tubing so it would go over it and have two through-bolts at each railing connection,” Glazier said. “We laser-cut those and welded them all to the HSS members.

“We had points at which the members couldn’t be continuous because they had to fit in our luggage, and at those points, we had moment sleeve connections. We laser-cut plates, welded them to one tube, and made a sleeve that was the exact outer diameter of the next tube for it to slide in. We had a bolt in each direction going through that moment sleeve.”

The project differed from SSBC or class design prompts when new information about the site and user needs arose during meetings with the substructure construction team and a local engineer. Design factors and requirements changed as a result, making the students think on their feet as they incorporated the new information into their design.

“When sizing the bridge, we were looking at a 36-in. width because it fits the ADA requirement in the U.S.,” Puliafico said. “When we met with the local team, they told us it needed to be close to 5 ft wide in case emergency services had to cross

with equipment. We were used to getting clear parameters ahead of time and working within those.”

The students were also conscious of the language barrier between them and the local construction team. Communicating meant relying on Maximo Nivel representatives to translate for both groups. Sometimes, communication involved only visual cues.

“We searched pictures of a truss bridge on Google and showed it to them over Zoom so they saw what we were trying to build and design,” Hodges said.

Given the circumstances, a design with no margin for error was impractical. The ultimate test of adaptability and anticipatory design came with the foundation, which had several iterations. The students were given limited hydraulic data before designing the bridge. They asked a geological professor for help conducting a basic test to determine the right bearing strength for the substructure. They initially designed a foundation that Hodges called “almost disgustingly over-designed.”

Their foundation plan, though, never became a reality. Delays in requesting permits by someone on the substructure construction team forced the on-site team to consult a local engineer to change the foundation plan to something that could be poured faster.

“We didn’t get the actual foundation plan until about a week and a half before we went to Costa Rica,” Hodges said.

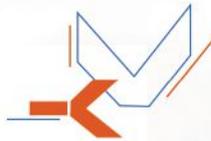


Designing with repeatable member sizes was key to constructing the bridge in one day.



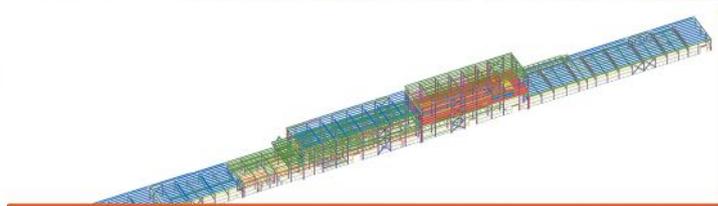
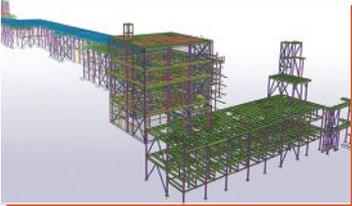
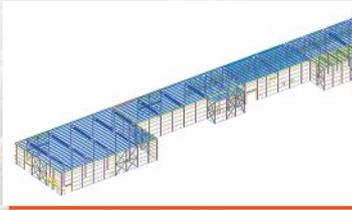
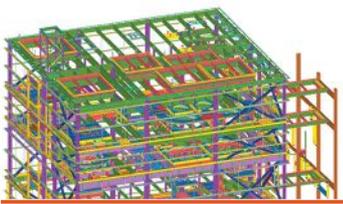
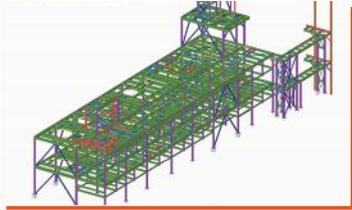
The superstructure and railings were constructed on solid ground before they were moved into place over the creek.

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The students assembled the bridge in 14 hours.

At that point, they could not alter the design and fabricate new members in time, and concrete could not be un-poured. But because they had shared comprehensive bridge plans and dimensions with the local team, they figured the foundations would accommodate the bridge. They were right—with one exception they learned about upon arrival. The abutments could not accommodate the bridge outriggers that were part of the truss support and deflection system.

Because a through truss has no overhead support, the design had to account for inward bowing when loading the deck in the

center. Outriggers were one support method. The bridge's rub rails and fence were also affixed to the railing to create extra rigidity. Upon installation, the rigidity without the outriggers was even greater than the students' analysis calculated. The composite decking rub rails, which go longitudinally along the truss, were thicker than the wood rub rails the students put into their analysis. It all made for a strong enough bridge without the outriggers.

"We over-designed in some other areas and did a lot of conservative calculations on the front end, so in the end, it didn't affect much," Hodges said.



The bridge has composite wood decking that was locally sourced.

That was the lone construction day hurdle. The students and the on-site crew built the entire thing—including decking, fencing, and railing—in 14 hours, drawing the curtains on seven months of applicable experience and unchecked ambition. They left Costa Rica with lessons to take to their careers and a tangible impact on people’s lives. Which, of course, was more than enough to earn an “A.”

“It’s above and beyond anything I’ve seen before,” Troxel said. “They had to find the project, and to find one that quickly was amazing. I don’t think they realized right away how much they did above a typical project.”



Patrick Engel (engel@aisc.org)

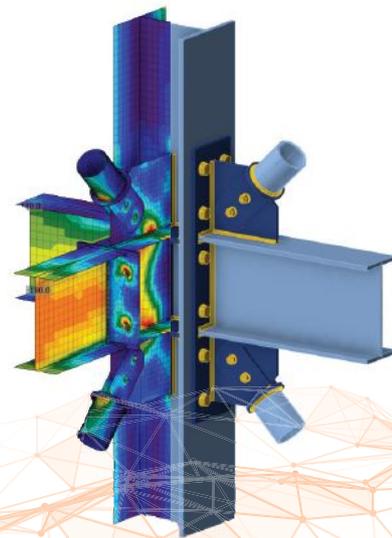
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Ever-Evolving Efficiency

BY PATRICK ENGEL

Fabricators design shop floor layouts with efficient material flow as the top priority, and one company's bold efficiency moves have boosted its entire operation.

ASK ANY STEEL FABRICATOR to identify the enemy of efficient material flow through a shop, and almost all will have the same answer.

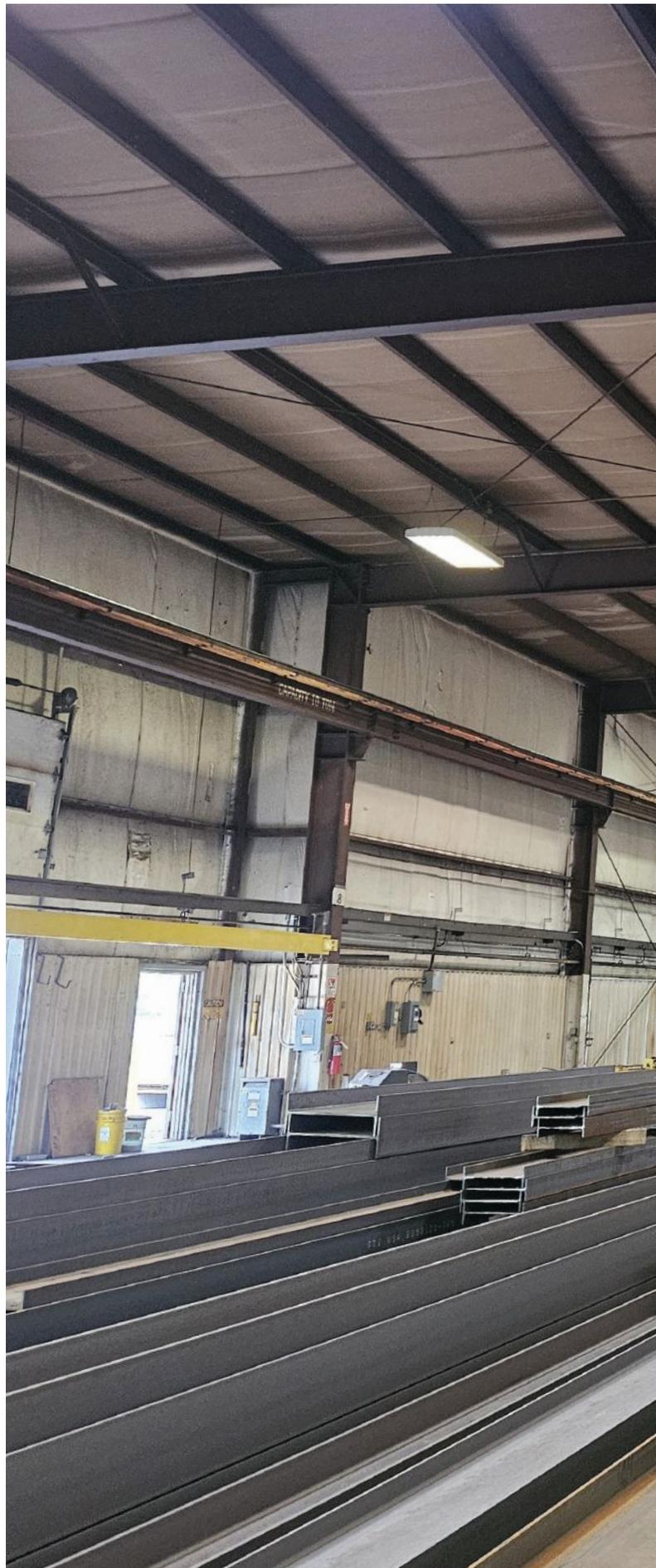
"Picking stuff up and putting it down two or three times before it gets to the fabrication stage kills hours," said Joe Lammers, president of AISC member Zalk Josephs Fabricators in Stoughton, Wisc.

Too much material handling can tank project timelines and drop the number of simultaneous projects a shop can handle. Steel goes to the shop to be fabricated, not picked up by cranes and sit in stacks. There's a necessary degree of handling to go from mill delivery to jobsite shipment, but minimizing it directly correlates to a shop's efficiency.

Like a dog's instinct to play fetch, fabricators are in a constant chase for improved efficiency, and Lammers and Zalk Josephs have taken bold steps to push theirs to impressive heights. Most notably, they shredded their shop floor to the studs in 2013 to flip the material flow direction by 180°. Ten years later, they replaced all the equipment added in that overhaul, thereby introducing several technological advances that improved safety, capability, and quality. Both overhauls reduced material handling time, space, and frequency and increased fabrication space.

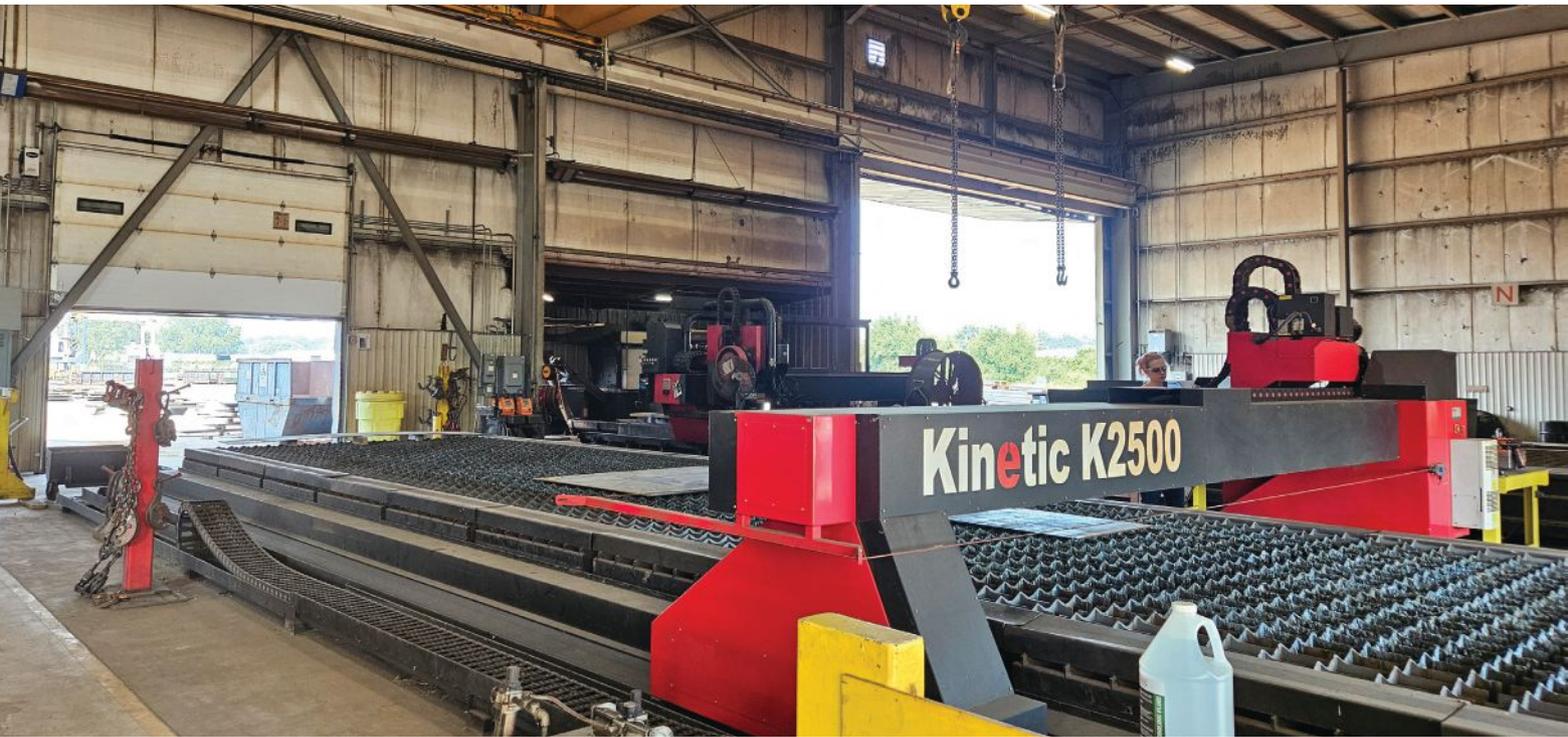
"The more square footage we can devote to fabricating, the more tonnage we can get out," Lammers said.

Sure enough, those two shop reworkings boosted Zalk Joseph's production and capability. The equipment replacements and upgrades in 2023 and 2024 added about 10,000 sq. ft of fabrication space and six new weld stations to the





AISC full member Zalk Josephs Fabricators has done two significant shop floor upgrades since 2013.



above: The first stop once steel enters the shop is a processing machine.

below: Steel leaves the shot blaster with a clean silver matte finish.



shop floor. When *Modern Steel Construction* visited the shop in early August, steel for five projects was flowing through it. Delivering orders on time and juggling several means running a shop without large bottlenecks.

“We’re constantly looking at continuous improvement and streamlining the process,” Lammers said.

Precise Processing

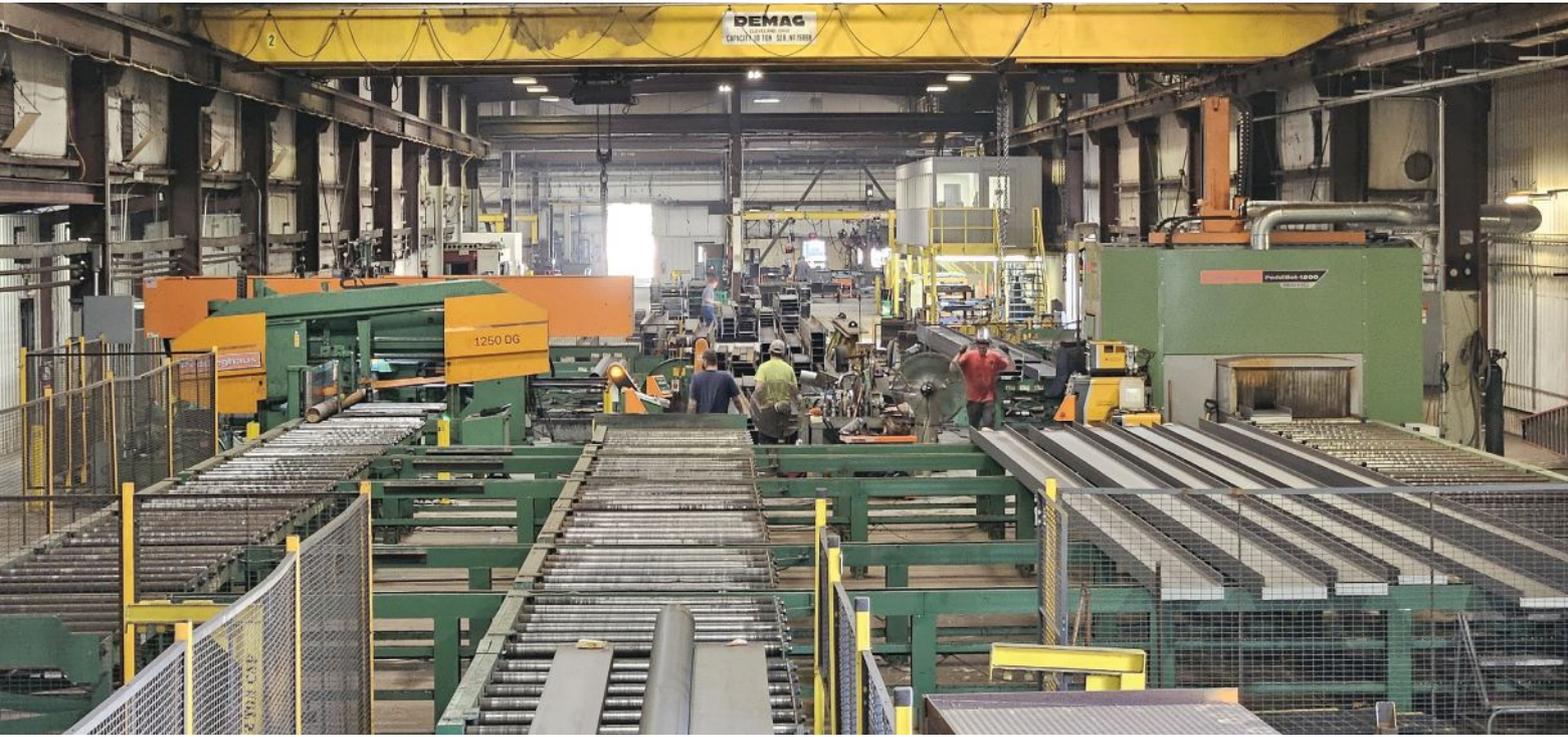
Maximizing shop floor efficiency does not present a choice of philosophies. Every fabrication company tries to do the same thing on its floor: Find locations with excess material handling or fabricators doing too many non-fabrication activities and eliminate them. The strategies differ shop to shop based on available space and the shop’s priorities, but the task does not change.

“It’s not rocket science,” Lammers said. “You find a good layout and try to reduce the time you’re picking up and putting down steel. You set your fabricators up with everything they need so they’re not walking around the shop looking for parts.”

Inefficient layouts are not intentional, but they can develop over time. Zalk Josephs has occupied the same 17-acre space since 1976, and incremental additions to an original shop floor plan can slowly introduce problem areas. Add a few appealing individual ingredients to an enjoyable food recipe over a few years, and eventually the recipe won’t taste the same. All the ingredients in a shop must work together to advance material to the end goal. Something that can be a good idea in a vacuum might not be right for the overall equation.

“You add a machine here, add a piece there, and eventually you realize the layout is not the best because things were added hodge-podge when you look at the entire picture,” Lammers said. “We added a building along the way, too.”

Before 2013, steel would leave Zalk Josephs’s processing area for one of two fabrication areas on opposite



sides of the building. Material handling wasn't only too frequent—the path material took through the shop wasn't standardized.

"We had some fabrication on the left and right side of the building when it came from processing," Lammers said. "Material went in two directions once it got to fabrication."

Undertaking the 180° flip did not close the shop during the reshuffle, but it sharply decreased capacity. It introduced one path from storage to processing to fabrication to staging for shipment. Three traveling lifts unload steel deliveries in a storage yard (which used to be the finished product staging area until 2013), organized by job. Two electric rail carts bring steel from the yard to the start of the processing area (formerly a post-fabrication painting bay). From there, it's unloaded onto rollers that send it into the shot blaster. It remains on conveyors and rollers and does not need a crane until it's done with processing.

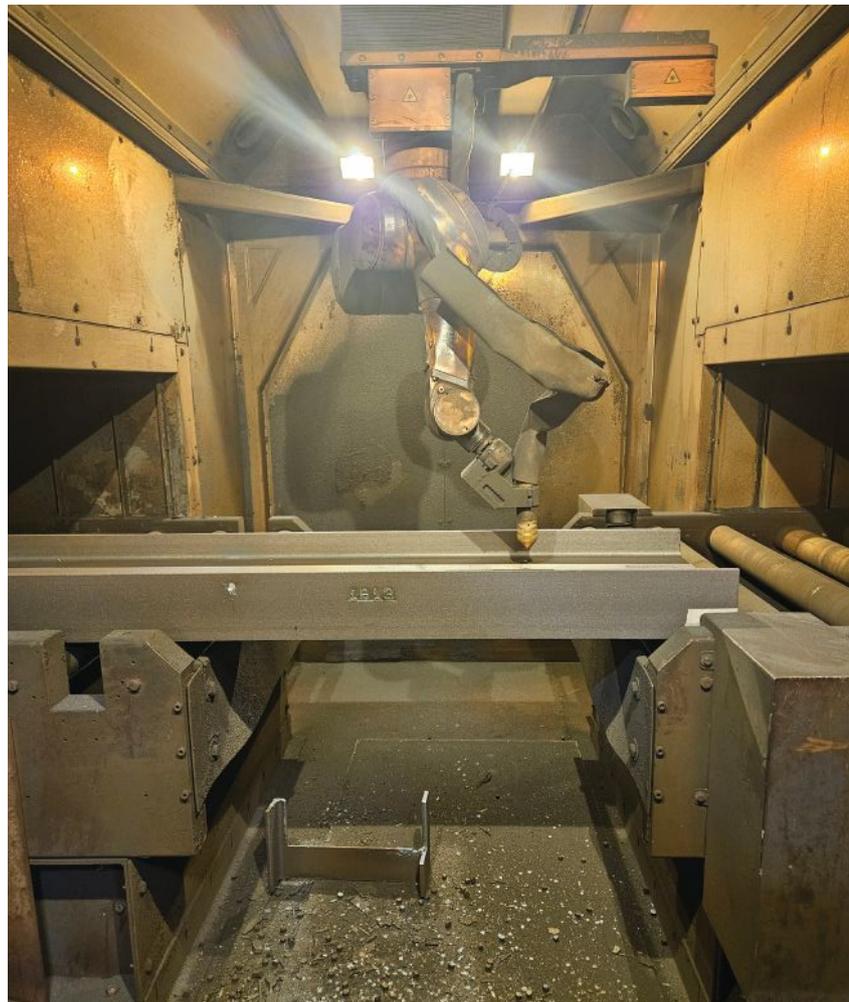
The blaster uses steel shot media to remove mill scale from each member, leaving a clean, dark silver matte finish. Steel continues on rollers and goes to one of two machines: a saw and drill in tandem or a robotic plasma cutter. Infill beams and coped beams usually go to the plasma cutter, and columns and large beams go to the saw and drill. Both machines are less than two years old and require minimal oversight. On the day *Modern Steel* visited, only four shop floor employees were working in the entire processing area as steel flowed through it.

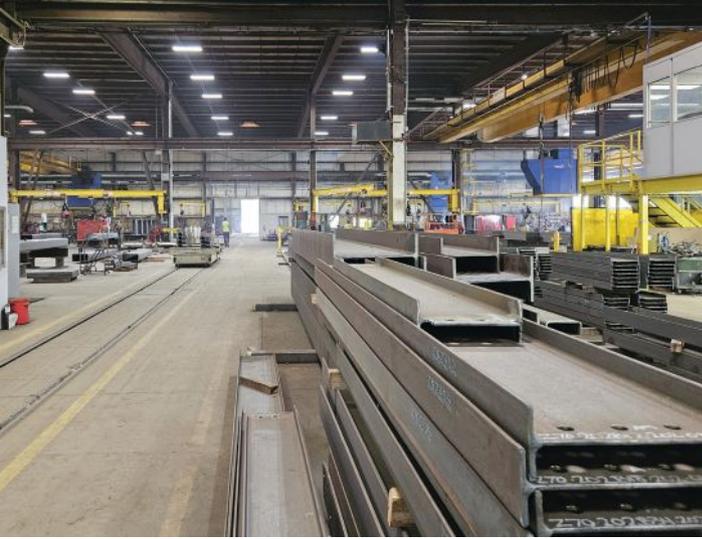
"It's a clean process and doesn't require a lot of bodies to move the materials through the processing line and into fabrication," Lammers said.

One of those four was a worker with an angle grinder who cleans up imperfections on members after they leave the processor and reach pre-fabrication storage. The new machines produce fewer imperfections, requiring less cleanup. Like their predecessors, they're CNC machines, but more advanced.

above: Once steel leaves the shot blaster, it heads to a plasma cutter or drill and saw.

below: The robotic plasma cutter can drill holes and cut steel.





above: Zalk Josephs shrunk its prefabrication waiting area when it upgraded machines in 2023 and 2024.

right: The shop has four main fabrication bays.

below: The heavy fabrication bay has a 25-ft, 10-in. crane hook height.



“Part of what drove some of the new equipment was quality coming off the machines,” Lammers said. “Before, we found that our fabricators did a lot of extra work to clean up copes, slots, and holes. It really should be a processing machine’s job. Investing in the new machines has led to a lot less of that extra work.”

The pre-fab storage area is two years old and a major part of creating the 10,000 sq. ft of fabrication space—along with the up-to-date and advanced processing machines that shrunk the processing space. It’s in a narrower part of the shop, no more than 50 ft wide, that couldn’t allow for much fabrication activity. The ability to turn that space into storage and remove rollers created room for a modular foreman’s office on newly installed risers along a wall. The office moved from its prior perch surrounding a building column in the middle of what’s now fabrication space.

“We were storing material where our workers should be fabricating,” Lammers said.

Fabrication Investments

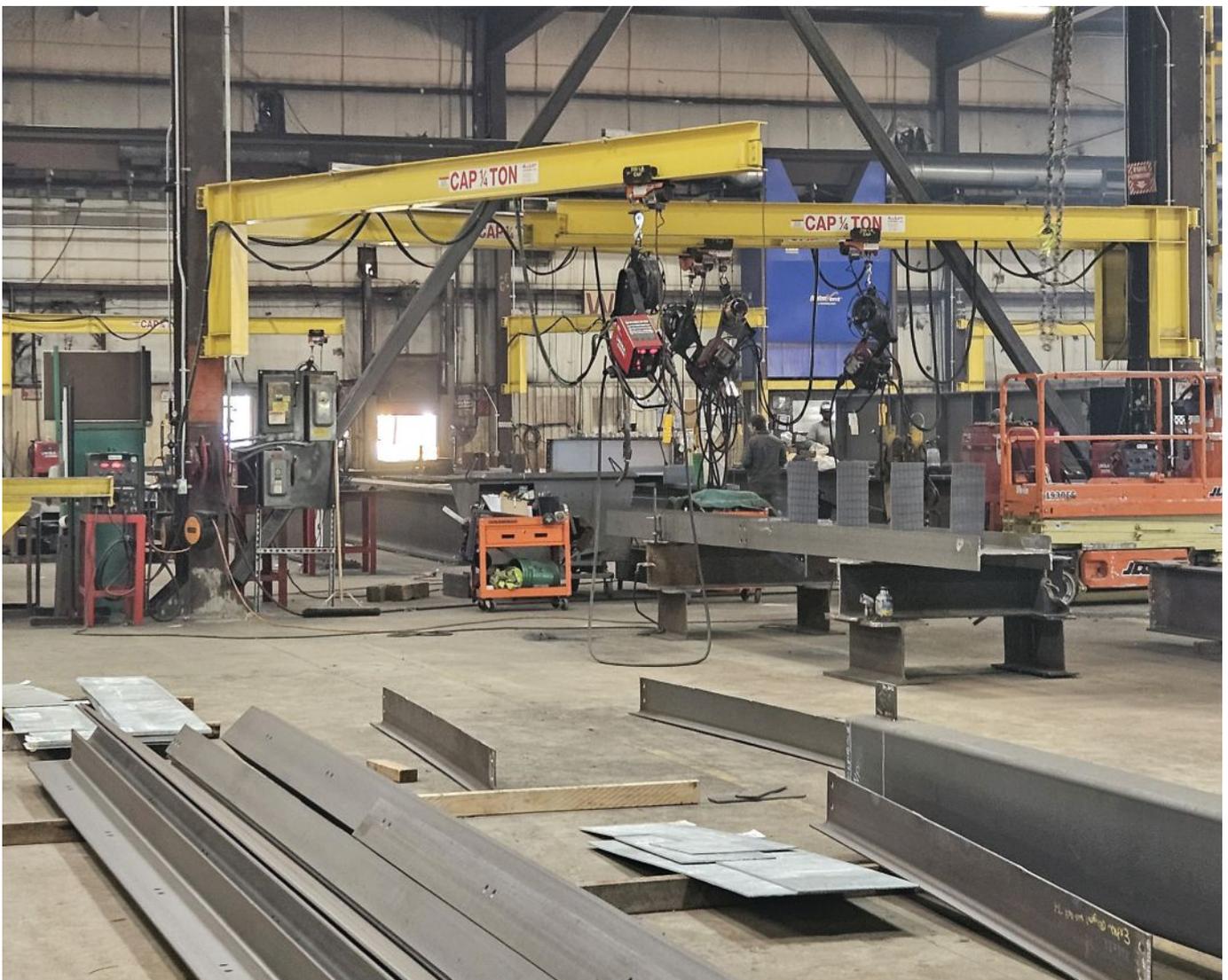
Zalk Josephs has four main fabrication bays, and the recent equipment purge mainly targeted those spots. Every weld station has yellow jib cranes attached to a building column that hold the

weld machines. Those elevated welding booms moved the machines off the ground, eliminating trip hazards and reducing wear-and-tear. One bay has two beam rotators, replacing the need for a crane to rotate the steel. The rotator holds the steel on suspended U-shaped chains that do not require rigging. It’s ideal for columns, heavier members, and members that need fabrication on four sides.

Two robotic welders were added in 2023 as an efficiency and capacity boost measure. Lammers saw them as a way to supplement fabricators and fill some of the newly created fabrication space. Using robots for basic welding tasks allows more fabricators to focus on complex fabrication or large pieces. They’re also a hedge against hiring challenges.

“It isn’t easy to find welders and people to work in the shop, so the robotic welders get more capacity through the shop without manual labor,” Lammers said. “With a specific type of work, they can really chew through material efficiently, accurately, and safely. They take up some square footage and don’t let you have a fabricator there, but they have driven significant increases in our capacity.”

Part of the pre-2013 processing area is now a heavy fabrication bay with a 40-ton overhead crane, the shop’s strongest crane and its highest hook height (25 ft, 10 in.). It’s a separate bay behind the



The weld stations in the fabrication bays were recently moved off the ground onto jib cranes to create a cleaner floor.



Zalk Josephs buys unfabricated steel by the job.



The shop has three overhead loaders that help move fabricated steel to the staging area for shipment.

Zalk Josephs



Zalk Josephs was the fabricator on the AISC IDEAS-Award winning Apple store on Chicago's Magnificent Mile.

Nigel Young/Foster+Partners

four main ones and right next to a door to the outdoor staging area. It's ideal for large sections and prefabricated pieces such as stadium trusses.

The shop has fabrication space for almost anything, a necessity for a company specializing in high-tonnage projects with various member types and designs. Zalk Josephs' portfolio includes several recognizable buildings in Chicago, including two that won AISC IDEAS Awards (formerly called the IDEAS² Awards): the Apple store on the Magnificent Mile (a 2019 award winner) and the downtown office tower called 150 North Riverside (2018).

"We've always focused on stuff that's difficult, has complex problems, not just simple beam and column work," Lammers said. "We've done heavy truss work, plate girders, jobs with logistical and engineering issues, and one-of-a-kind stuff."

A Workforce Boost

An efficiency and output boost isn't the only desired outcome from Zalk Josephs' overhauls. Those came when the company was undergoing a significant shop-floor employee shift where several 40-plus-year veterans retired, slashing its average employee tenure. Lammers hoped the investment in new equipment and the show of intent would help create the next generation of long-term employees.

"We invested in a lot of equipment that makes our workers' lives easier," Lammers said. "You're not using 20- or 30-year-old machines that are always breaking down. People can see we're invested in our people and the tools they need to be successful. That's especially true for younger people coming out of welding school. They see nice welders and new equipment, and they see us as a place where they want to work."

Zalk Josephs has about 70 shop floor employees and 100 overall. After the equipment upgrades were completed in 2024, the company added a third shift that bumped the shop to seven-days-a-week operation. The weekend shop floor employees work three 12-hour shifts Friday through Sunday, while the two shifts of weekday workers have four 10-hour shifts Monday through Thursday. Three shifts keep the equipment running and maximize the investment in it, especially when employees aren't spending much time on material handling.

"That has driven a lot of growth for us over the last couple years," Lammers said.

The growth and bold strokes that spurred it come from a constant search for improvement that isn't just about finding efficiency. It has roots in one of Zalk Josephs' three core values under Lammers: stay hungry. The thought of flipping a shop floor and upgrading an entire equipment fleet after only 10 years doesn't come from complacency.

"We want our people to have the mindset," Lammers said, "of not sticking with the status quo." ■



Patrick Engel (engel@aisc.org) is the associate editor of *Modern Steel Construction*.

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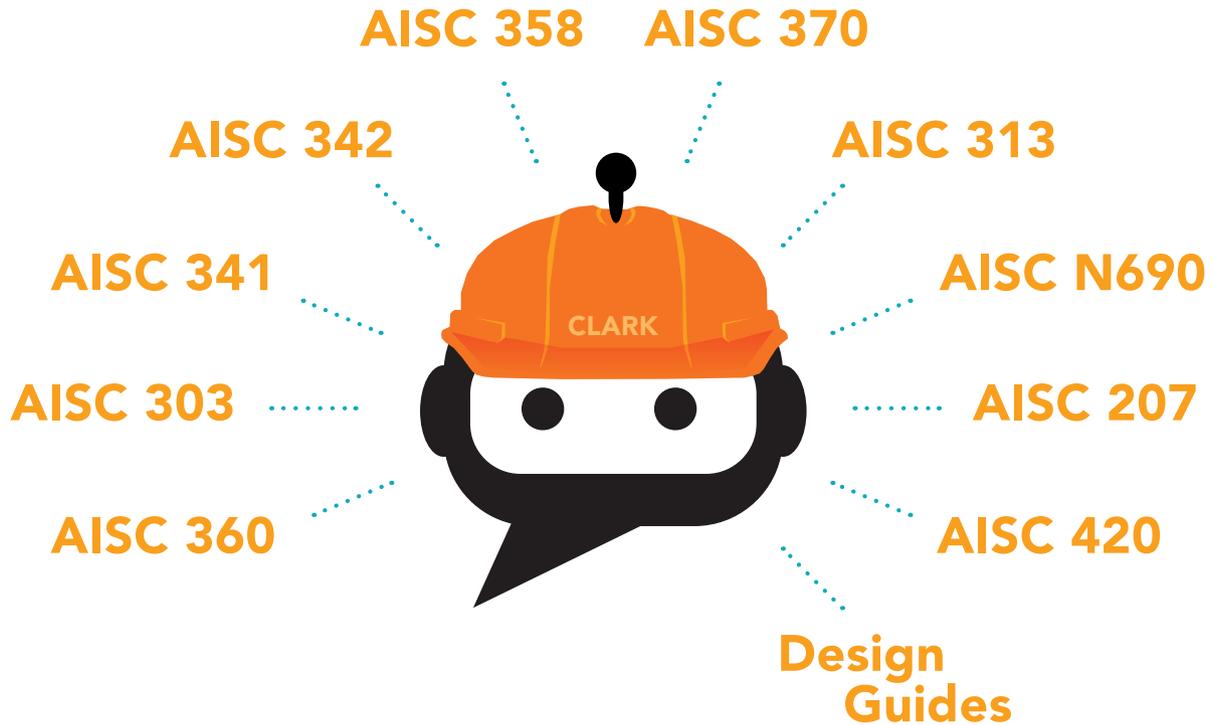
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new products

This month's new products include an elevated jobsite welder, a welding machine with several MIG modes, and an all-in-one cutting machine.

JLG SkyWelder

The JLG SkyWelder onboard welder is a fully integrated welding solution designed to enhance efficiency and safety on elevated jobsites. This system combines a 280-amp Miller CST 280 welder with the lift platform's built-in power source, eliminating the need for bulky, ground-based welders and excess cables. With stick and TIG welding capabilities and optional flux core wire feed, the SkyWelder delivers the versatility required for a wide range of welding applications.

The SkyWelder seamlessly connects to JLG's SkyPower system, a self-contained 7500W AC solution that powers multiple JLG accessories. With its integrated power cable and quick-attach capabilities, SkyPower allows operators to switch between accessories effortlessly while eliminating downtime associated with repositioning or tracking separate power sources. Key features include:

- Powerful and versatile: 280-amp welder with platform-mounted amperage adjustment supports stick and TIG welding.
- High performance: 100% duty cycle at 200 amps to handle demanding welding tasks with ease.
- Enhanced jobsite safety: Weld cables are factory routed, reducing cable damage and minimizing the risk of leads hanging over rails.
- Multi-tool power supply: Supplies power to both the welder and platform tools—lights, grinders, drills—without needing to reposition ground equipment.
- Theft-resistant: Secured directly to the platform to help prevent theft on the jobsite.
- Optional flux core wire feed: Additional welding flexibility when paired with Miller Electric resources.

For more information, visit www.jlg.com.



ESAB Warrior Edge 500 DX

ESAB introduced its Warrior Edge 500 DX that now features four advanced MIG WeldModes and an advanced pulse WeldMode. All WeldModes enhance arc stability, offer more control at faster travel speeds, and reduce spatter by up to 85% (depending on the processes compared) for less post-weld cleanup. With Warrior Edge DX, manufacturers and fabricators can optimize productivity, improve quality, consistency, and simplify training.

Users set up material on an intuitive TFT LCD interface inside the Robust-Feed Edge DX wire feeder. The feeder's streamlined front panel features day-to-day controls, quick job (memory) buttons, WeldMode selection, and RFID badge-controlled access to promote consistency and manage a workforce with varying degrees of skills. The Warrior Edge 500 DX, with a rated welding output of 500 amps at 60% duty cycle, has built-in connectivity and comes with a lifetime subscription to the InduSuite WeldCloud Fleet online software application. For more information, visit www.esab.com.



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The KINETIC K6000 combines the company's XMC plasma cutting, drilling, and milling system with a dedicated laser cutting head into a single table. Fabricators now can process metal with the widest range of cutting and drilling options on a single machine. With a full range of processes available on a single table, fabricators can streamline their production workflows, saving substantial time and dramatically increasing output. From plasma and laser bevel cutting, to drilling, tapping, milling, and part marking, the K6000 allows engineers to specify their preferred cutting methodology and processes for each part without the need for time-consuming manual workflows or the expense of multiple independent machines. For more information, visit www.kinetic.com.

STEELDAYS

Join the SteelDays Fun From Your Computer or Phone

Free PDHs and fun prizes from AISC are available without leaving the comfort of your home or office.

SteelDays, AISC's annual celebration of the steel industry, returns for its 16th year this fall. As usual, AISC is sponsoring events, tours, and seminars across the country. But more importantly, you can participate with just a computer or phone. There's a free webinar on designing with

AI. A trivia contest. Wordles. Hidden-gem AISC resources. And, of course, loads of resources to help you learn about American structural steel, the people who make it happen, and how it can help your next project. Be sure to check in every day from October 20–24 to celebrate and learn about 150 years of American structural steel and its exciting future. Tons of fun awaits you every day at [aisc.org/steeldays!](https://aisc.org/steeldays)

DESIGN GUIDES

AISC Releases Updated Design Guide for Composite Column Design

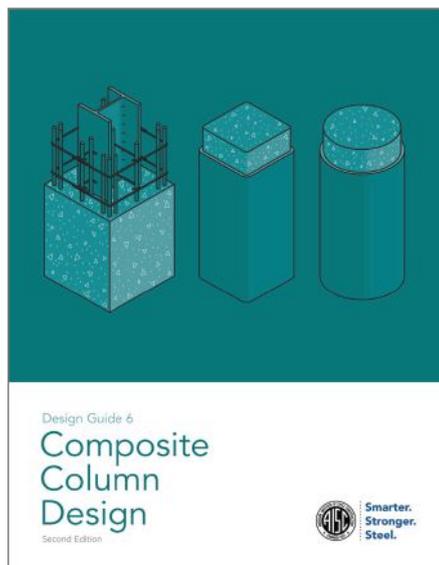
AISC has released Design Guide 6: *Composite Column Design*, Second Edition, the steel industry's cornerstone reference for designing steel-concrete composite columns. The new edition of Design Guide 6 (formerly *Load and Resistance Factor Design of W-Shapes Encased in Concrete*) adds guidance for square, rectangular, and round filled composite columns, all reflecting the modern requirements from the 2022 AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-22). The updates also include the latest guidance for encased composite columns and designing connections to composite columns. A new spreadsheet-based

tool can help designers calculate available axial, flexural, and shear strengths of composite members.

"Composite steel-concrete columns remain a fixture of the built environment, and it's very important that designers stay up-to-date on best practices," said AISC vice president of engineering and research Christopher H. Raebel, SE, PE, PhD. "This updated design guide is an easy one-stop shop developed specifically to help engineers do precisely that."

Design Guide 6 is now available for download at aisc.org/dg. Like all digital design guides, it is free for AISC members. AISC would like to thank the experts who collaborated to update this reference for their time and dedication. They include:

- Matthew S. Trammell, SE, PE, founder and principal engineer, Trammell Engineering Group, LLC
- Mark D. Denavit, PE, PhD, associate professor, University of Tennessee, Knoxville
- Tiziano Perea, PhD, professor, Universidad Autónoma Metropolitana
- Jerome F. Hajjar, PE, PhD, CDM Smith professor, university distinguished professor, and chair of the Department of Civil and Environmental Engineering, Northeastern University
- Roberto T. Leon, PE, PhD, professor of civil and environmental engineering, Virginia Tech



People & Companies

Steel Dynamics Inc. (SDI) announced that each of its steel mills has attained Global Steel Climate Council (GSCC) product certification, validating that steel products are on the path to achieve the goals of the Paris Climate Agreement's 1.5°C scenario.

The GSCC's *Steel Climate Standard* provides a single, technology neutral framework for product certification, allowing steel customers transparency when making lower-carbon emissions steel product purchasing decisions. The *Steel Climate Standard* is aligned with the International Energy Agency's *Net Zero by 2050: A Roadmap for the Global Energy Sector*. The *Steel Climate Standard* measures key steelmaking greenhouse gas (GHG) emissions through hot rolling including Scope 1, Scope 2, and upstream Scope 3 emissions categories. Each of the company's steel mills 2024 GHG emissions intensity data were verified by a third-party, KERAMIDA, and certified by the GSCC.

Walter P Moore has opened an office in Phoenix, its 26th location in the U.S.

"Expanding into Phoenix reinforces our commitment to serving clients in high-impact sectors such as healthcare, federal, aviation, hospitality, and advanced manufacturing," said Dilip Choudhuri, Walter P Moore President and CEO.

The company named **Bryan Salt** as the managing director for its Structures Group in Phoenix. Salt brings more than 30 years of experience delivering complex projects across sectors including healthcare, life sciences, advanced manufacturing, higher education, government, sports, and aviation. The Phoenix office also welcomes **Christopher Pfeiff** as practice area director for construction services. Pfeiff has 25 years of experience delivering innovative construction solutions to complex projects as an executive in the construction industry.

SSRC

SSRC Celebrates 25 Years of The Vinnakota Award

In the late 1990s, Sriramulu (Ramulu) Vinnakota, then a professor of structural engineering and structural mechanics at Marquette University (now a professor emeritus), proposed to the Structural Stability Research Council (SSRC) the creation of the Sarada M. and Raju A. Vinnakota Award. It would be presented annually to the student who is the primary author and presenter of the best research paper at the SSRC Annual Stability Conference. This award was inspired by Vinnakota's wish to honor his parents, who believed in the benefits of educating children in India in the 1950s, and his wish to thank the SSRC for the help with his doctoral research in the 1960s (through publications and exchanges with Ted Galambos and Le-Wu Lu). Vinnakota hoped the award would encourage and stimulate student participation and involvement in SSRC activities.

The Vinnakota Award's impact was immediate and lasting. Since its first presentation in 2000 (to Brian Chen), student participation at the Annual Stability Conference has grown significantly and students have accounted for a substantial portion of papers presented at recent conferences. The award became a cornerstone of SSRC's efforts to cultivate the next generation of structural stability researchers.

The 2025 Vinnakota Award presentation at NASCC: The Steel Conference in Louisville, Ky., marked a significant milestone in the award's history: its 25th anniversary. Its recipient was Eman Abdullah, a graduate research assistant at North Carolina State University, who co-authored the paper "Analytical Investigation of Plate Buckling Capacity Under Inelastic Cyclic Loading" with her advisor, Andrew Ziccarelli.

The Vinnakota Award's influence has extended beyond the conference, as several winners have built successful careers in academia and industry. Notable examples are Nuno Silvestre (2004), current editor in chief of *Thin-Walled Structures*, Mark Denavit (2012), current Vinnakota Award Committee chair, and Hannah Blum (2016), current SSRC Executive Committee member. The complete winner list, as well as more information about the award, can be found at ssrcweb.org/vinnakota-award.

As the SSRC celebrates the Vinnakota Award's 25th anniversary, it also celebrates the enduring legacy of mentorship, innovation, and generosity the award represents. What began as a simple act of support for student researchers has grown into a defining feature of the SSRC's vision and mission and a beacon for the future of structural stability research. The award has also had a profound effect on the SSRC community itself. The following reflections from a few longtime SSRC members attest to the award's impact and significance over the past 25 years.

Ted Galambos, former SSRC Executive Committee chair:

"Ramulu Vinnakota had the vision that it is vital to bring talented young engineers into the field of structural stability research. The Vinnakota Award has enhanced the careers of numerous young researchers who have introduced new knowledge to our exciting and important engineering profession."

Ron Ziemian, former Executive Committee chair and adviser of the 2006 award winner:

"In the late 1990s, SSRC was experiencing a very challenging period, and the creation of the Vinnakota Award gave the council a chance to rally around something truly inspiring. At the time, both ends of the spectrum became wonderfully recognized, from established professors receiving the Lynn S. Beedle Award to brilliant students being honored with the Vinnakota Award. Today, after the recent establishment of the McGuire Award for Junior Researchers (MAJR Medal) and the Yoon Duk Kim Young Researcher Award to honor early-career scholars, it is fair to argue that the full career spectrum is now recognized."

Todd Helwig, former Executive Committee chair and adviser of the 2005 award winner:

"The Vinnakota Award played a very important role in increasing student involvement with SSRC, since it provided a vital link to keeping the council thriving with energetic young members who have

gone on to become future leaders of the organization."

Dinar Camotim, past Vinnakota Award Committee Chair (2010–2023) and adviser of several award winners:

"It was not until Ron Ziemian invited me to chair the Vinnakota Award Committee in 2010 that I became fully aware of how inspiring and visionary the establishment of this award had been—hats off to Ramulu Vinnakota! It fostered great interest amongst graduate students working on stability issues from all over the world, and this interest only increased with time, as attested by the growing number of candidates and inquiries about eligibility. Since the award is always announced at the SSRC Annual Stability Conference and must be received in person, witnessing the mixture of surprise and joy suddenly surfacing in the eyes of the winner is an unforgettable experience."

Beside the significant impact the Vinnakota Award has had on SSRC and the structural stability community at large, it has also greatly influenced the research activities and career paths of many individual award winners. This influence is evidenced by reflections from several winners and their career paths.

Nuno Silvestre, full professor of structural and computational mechanics at the University of Lisbon, Portugal; 2004 winner:

"Winning the Vinnakota Award left me literally in shock, since it had not even crossed my mind that this would be possible. I still remember how proud I felt and how motivated I was to pursue my research work after receiving this award."

Ian MacPhedran, who teaches steel design at the University of Saskatchewan; 2009 winner:

"I was very honored to have received the Vinnakota Award. It helped encourage me to create a graduate course on structural stability which I have taught several times since its initial offering in January 2010."



<< cont.

Mark Denavit, associate professor at the University of Tennessee, Knoxville; 2012 winner:

"For me, it was confirmation that I was on the right track with my research and my career. It further motivated me to pursue a career in structural engineering research and, eventually, my current position."

Merih Kucukler, associate professor at the University of Warwick; 2014 winner:

"Winning the Vinnakota Award filled me with joy and made me feel that what I was doing had some merit. It gave me a confidence boost that was decisive for my future research career."

André Martins, assistant researcher at the University of Lisbon; 2015 winner:

"When I received the Vinnakota Award, which followed an honorable mention in the previous year, I was literally on top of the world. It reassured me about the quality of my work and filled me with confidence to tackle challenging problems."

Vahab Esmacili, postdoctoral fellow at the University of Alberta; 2021 winner:

"To me, the Vinnakota Award was more than recognition. It was a reminder that meaningful contributions matter. That belief has stayed with me, offering strength during the inevitable setbacks that come with research."

Bashar Hariri, postdoctoral fellow at the University of Toronto; 2024 winner:

"Receiving the Vinnakota Award has been a significant milestone in my career. It provided valuable recognition early on, which boosted my confidence and visibility in the structural steel research community."

The Vinnakota Award's success inspired Vinnakota to establish similar awards at other institutions, such as the SEED Foundation in Washington, D.C.; the Jawaharlal Nehru Technological University, Kakinada (JNTUK) in India (his alma mater); and the Federal Institute of Technology in Lausanne in Switzerland (where he earned his doctorate).

AISC certification sets the quality standard for the structural steel industry and is the most recognized national quality certification program. It aims to confirm to owners, the design community, the construction industry, and public officials that certified participants, who adhere to program criteria, have the personnel, organization, experience, documented procedures, knowledge, equipment, and commitment to quality to perform fabrication, manufacturing, and/or erection. Find a certified company at aisc.org/certification.

The following U.S.-based companies were newly certified or renewed certification in at least one category from July 1–31, 2025.

Newly Certified Companies (July 2025)

- Brion Hardin Construction Co., Inc., Tuscaloosa, Ala.
Fabrication Specialties of Arkansas, Van Buren, Ark.
Flex-Erect, Houston
H&H Iron, Oklahoma City
Harris County Ironworks, LLC, Ellerslie, Ga.
JE Dunn Construction, Kansas City, Mo.
MBI Construction Services, Inc., Yakima, Wash.
SteelPro LLC, Memphis, Tenn.
Structural and Steel Products, Inc., Crowley, Texas
Whitmore Steel, Inc., Spring Valley, Calif.

Certification Renewals (July 2025)

- 4G Steel Fabrication LLC, Lincoln, Neb.
Advanced Resources & Construction Enterprises, Inc., Kingfield, Maine
Aetna Bridge Company, Warwick, R.I.
AFC Steel, Ennis, Texas
Amelie Construction & Supply, LLC, Spring Church, Pa.
American Steel, Inc., Billings, Mont.
Anco Iron & Construction Inc., San Francisco
AOP Metal Fabricators, Crossett, Ark.
Arnold Steel Company, Inc., Howell, N.J.
Asbury Steel, Inc., Spring Valley, Calif.
Auciello Iron Works, Inc., Hudson, Mass.
AZCO Inc., Greenville, Wisc.
Baten Steel Erectors LLC, Hurst, Texas

- Bear Creek Fabrication, LLC, Bear Creek, N.C.
Berger Steel Corporation, McClellan, Calif.
Bergh's Fabricating, Inc., Willmar, Minn.
Berkshire Bridge & Iron Co., Inc., Dalton, Mass.
Beson & Houle, Neenah, Wisc.
Best Steel, LLC, Longmont, Colo.
Beverly Steel, Inc., Knoxville, Tenn.
BR Welding, Inc., Howell, N.J.
Bret Steel, Dover, N.H.
Bridge Brothers Inc., Pickens, Mo.
Broadwind Heavy Fabrications, Manitowoc, Wisc.
Builders Steel Company, North Kansas City, Mo.
C.D. Smith Construction, Inc., Fond Du Lac, Wisc.
Capital Steel Erectors Inc., Blue Mounds, Wisc.
Central Texas Iron Works, Schertz, Texas
Central Texas Iron Works, Waco, Texas
Century Steel Fabricating, Inc., Camby, Ind.
Champion Bridge Company, Wilmington, Ohio
Chesapeake Bay Steel, Norfolk, Va.
Chicago Steel Construction, LLC., Merrillville, Ind.
Chillicothe Iron & Steel, Inc., Chillicothe, Mo.
Cives Steel Co., Wolcott, Ind.
Composite Company Inc., Sherborn, Mass.
Concord Fabricators, Inc., Grove City, Ohio
Conewago Manufacturing LLC, Hanover, Pa.
Construction Systems, Inc., Maple Plain, Minn.
Continental Steel Works Inc., Butte, Mont.
Cooper Steel, Shelbyville, Tenn.
Corona Steel, Inc., Lakewood, Wash.
D&D Welding and Fabrication, LLC, Cove, Utah
D.A. Collins, Wilton, N.Y.
D.S. Brown, North Baltimore, Ohio
Danny's Construction Company, LLC, Shakopee, Minn.
Davis Iron Works, Hewitt, Texas
Derr and Gruenewald Construction Co., Henderson, Colo.
DI Highway Sign & Structure Corp., New York Mills, N.Y.
DiversaTech-MetalFab, LLC, Gridley, Ill.
Doral Corporation, Milwaukee
Ducci Electrical Contractors Inc., Farmington, Conn.

- Dutchy Enterprises LLC, Coco, Fla.
 E&Y General Construction Group,
 Staten Island, N.Y.
 EDCO, INC., Mt. Vernon, Wash.
 Elderlee, Inc., Oaks Corners, N.Y.
 Elevated Steel LLC, Adairsville, Ga.
 Engineered Building Products, Inc.,
 Bloomfield, Conn.
 Ennis Steel Industries Inc.,
 Fort Worth, Texas
 E-Z Line Pipe Support Co., LLC,
 Marvel, Texas
 Ezarc Welding, Inc., Pleasant Grove, Utah
 Fiedelvey Steel Fabricators, Inc.,
 Cincinnati
 Finnoe Design LLC, Spokane, Wash.
 Foundation Steel, LLC, Swanton, Ohio
 GEM Buildings, Brigham City, Utah
 Gem City Steel Supply, Inc., Marietta, Ga.
 General Welding & Fabrication Inc.,
 Watertown, Conn.
 Group Steel Erectors, Inc., Ridgeland, Miss.
 GSI Highway, Hutchins, Texas
 H B Welding, Inc., Johnston, R.I.
 Hancock Structural Steel, LLC, Findlay, Ohio
 Harmon Steel Inc., Indianapolis
 Harold O'Shea Builders, Springfield, Ill.
 Hefco Enterprises Inc., Fresno, Texas
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 Indiana Steel Fabricating, Inc., Indianapolis
 Industrial Constructors/Managers Inc.,
 Pueblo, Colo.
 Industrial Constructors/Managers, Inc.,
 Commerce City, Colo.
 Indy Steel Erectors, Camby, Ind.
 J&S, New Haven, Conn.
 J.R. Hoe, Middlesboro, Ky.
 JH Findorff, Madison, Wisc.
 Kankakee Valley Steel, Wheatfield, Ind.
 Kansas City Structural Steel, Inc.,
 Kansas City, Mo.
 Keeley Construction Group, Canton, Ohio
 Kenric Steel LLC, Millville, N.J.
 KMH Steel Erectors, Maple Plain, Minn.
 L.P.R. Construction Co., Loveland, Colo.
 LeJeune Steel, Barronett, Wisc.
 LeJeune Steel, Minneapolis
 LMC Industrial Contractors, Inc.,
 Dansville, N.Y.
 Lockport Steel, LLC, Lockport, Ill.
 Lunda Construction Co.,
 Black River Falls, Wisc.
- March-Westin, Morgantown, W.V.
 Marcon Metal USA Inc., Ferndale, Wash.
 Martin Iron Works, Inc., Reno, Nev.
 Marvin Metal Fabricating Inc.,
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 Mound Technologies, Inc.,
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 Nashville Fabrication, Ashland City, Tenn.
 NEFCO Service Divisions LLC,
 Canton, Mass.
 New England Bridge Products,
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 P.H. Drew Inc., Indianapolis
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 Cedar Rapids, Iowa
 Pillar Innovations, LLC, Grantsville, Md.
 Powers Built Structures Inc., Hudson, Colo.
 Process Systems Inc. Construction
 Company, Memphis, Tenn.
 Providential Fabricators, Inc.,
 Memphis, Tenn.
 Puritan Manufacturing, Omaha, Neb.
 Qualico Steel Co., Inc., Midlothian, Texas
 Quality Steel Services, Inc.,
 Loveland, Colo.
 R&S Steel, LLC, Rome, N.Y.
 Ramar Steel Sales, Inc., Rochester, N.Y.
 Red Dog Fabrication, LLC,
 Ridgefield, Wash.
 Rednour Steel Erectors, Marissa, Ill.
 Reno Iron Works Co., Inc., Reno, Nev.
 Rhoads Industries, Inc., Philadelphia
 Robinson Construction, Perryville, Mo.
 Rochester Rigging, Inc., Bloomfield, N.Y.
 Rochester Structural, Rochester, N.Y.
 Rocky Mountain Steel, Inc., Olathe, Colo.
 Rodney Hunt, Orange, Mass.
 Schuff Steel, Stockton, Calif.
 Scougal Rubber Corporation,
 McCarran, N.Y.
 Seither & Cherry Co., Keokuk, Iowa
 Selco Manufacturing Corp.,
 West Caldwell, N.J.
 Shamrock Construction Group Inc.,
 Keyport, N.J.
- Simko Industrial Fabricators,
 Hammond, Ind.
 Skrlin Coating and Blasting Ltd.,
 Niagara Falls, N.Y.
 Skyline Steel Erectors, Oroville, Calif.
 SNS Iron Works, Inc., Frederick, Colo.
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 Houma, La.
 Sowles Co., Shakopee, Minn.
 SPE Inc., Little Chute, Wisc.
 Specks Fabrication and Cutting,
 Thibodaux, La.
 Steel Construction Services,
 Fort Worth, Texas
 Steel Service Corporation, Flowood, Miss.
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 Steel Technology, Inc., Rocky Mount, N.C.
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 Stellar Steel Erectors LLC, Suffield, Conn.
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 Structures Derek International S.A.,
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 Tech Dynamics, Inc., Perrysburg, Ohio
 The Boldt Company, Appleton, Wisc.
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 The L.C. Whitford Co., Inc., Wellsville, N.Y.
 Thomas Company, Inc.,
 Egg Harbor Township, N.J.
 Tincher's Welding LLC, Harvesyburg, Ohio
 Titan Steel Erectors, LLC, Memphis, Tenn.
 Trinity Fabricators, Inc.,
 Green Cove Springs, Fla.
 Tri-Steel Fabricators, Inc., Trenton, N.J.
 Tutor Perini, New Rochelle, N.Y.
 Virginia-Carolina Steel, Inc., Norfolk, Va.
 W&W|AFCO Steel, Bristol, Va.
 W&W|AFCO Steel, Colfax, N.C.
 W&W|AFCO Steel, Montgomery, Ala.
 W&W|AFCO Steel, Nashville, N.C.
 W.E.B. Production & Fabricating, Inc.,
 Franklin Park, Ill.
 Wabash Steel Company LLC,
 Vincennes, Ind.
 Western Slope Iron & Supply, Inc.,
 Grand Junction, Colo.
 Western States Steel Erection,
 Billings, Mont.
 Wheeler, Shakopee, Minn.
 Wilson Iron Works, Crown Point, Ind.
 W-Industries of Texas LLC, Spring, Texas
 WMK, Billings, Mont.

AISC AISC Fabricator Training Program Earns Two 2025 Awards

AISC's online program to provide entry-level shop employees with the knowledge they need to succeed in the fabrication industry has earned recognition from national and international organizations this year.

The Fabricator Education Training Program—and its development partner, Artisan Learning—was a bronze winner in the 2025 International E-Learning Association (IELA) Awards under the “online learning experience” category. AISC worked with Artisan, an online learning course developer, to create the program and launched its first courses last summer. The program also earned an American Society of Association Executives (ASAE) silver Power of Associations Award. Previously, it received a Best in Show Award from DevLearn in 2024.

The Fabricator Education Training Program aims to supplement in-person training and provide AISC member fabricators with an easy way to introduce basic concepts to new employees. It helps new

hires quickly acquire the necessary skills to feel more involved and supported in their new position, whether it's their first job in the fabrication industry or a move into a new role on the shop floor.

The program has three primary sections: fabricator fundamentals, layout and fit-up, and welding training. The first two have a combined 36 courses that total 15 hours of training. There are three welding training courses available, with more scheduled for release in late 2025.

“When fabrication shops hire new staff, they need to get them onboarded and up-to-speed quickly,” said Joel Landsverk, AISC Fabricator Education Program manager. “Our curriculum is designed to cover everything from the proper use of a tape measure to layout and fit-up of a beam with complex pitch—skills and concepts that fabricators need throughout their careers. Essentially, we step in as a supplementary trainer to equip the team on a shop floor to do their best work and grow as skilled professionals.”

ASAE's Power of Associations Awards showcase how associations leverage their unique resources to solve problems, advance industry or professional performance, kick-start innovation, and improve conditions around the world.

“Congratulations to AISC for exemplifying the impact associations have on the industries and professions they represent, and on society at large,” said Michelle Mason, ASAE President and CEO. “It's always so incredibly satisfying to see associations going above and beyond their everyday mission to change the world. We're very proud to spotlight this award-winning initiative.”

The program is free for all AISC member fabricators. To see the full course list and sign up, visit aisc.org/fabricator-training. For a deeper look into how and why AISC created the program, read “Workforce Development Win” in the October 2024 issue at modernsteel.com/archives.



Able Steel's Kenny Hicks (right) was a primary figure in developing the Fabricator Education Training Program and appears frequently in its courses.

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Steel Community Staple

THE WORLD'S FIRST bikeable office building graced the cover of *Modern Steel Construction's* October 2023 issue one year after it opened. Ledger, an office and coworking space in Bentonville, Ark., used structural steel to find a floor-to-floor height ratio that fit six stories within the city's 100-ft height restriction and was more economical than an initial concrete design. The building also has outdoor bike ramps from the sidewalk to the roof and a weathering steel and glass exterior.

It has also quickly become a downtown Bentonville icon and an expectedly snug fit in a biking-obsessed area. When *Modern*

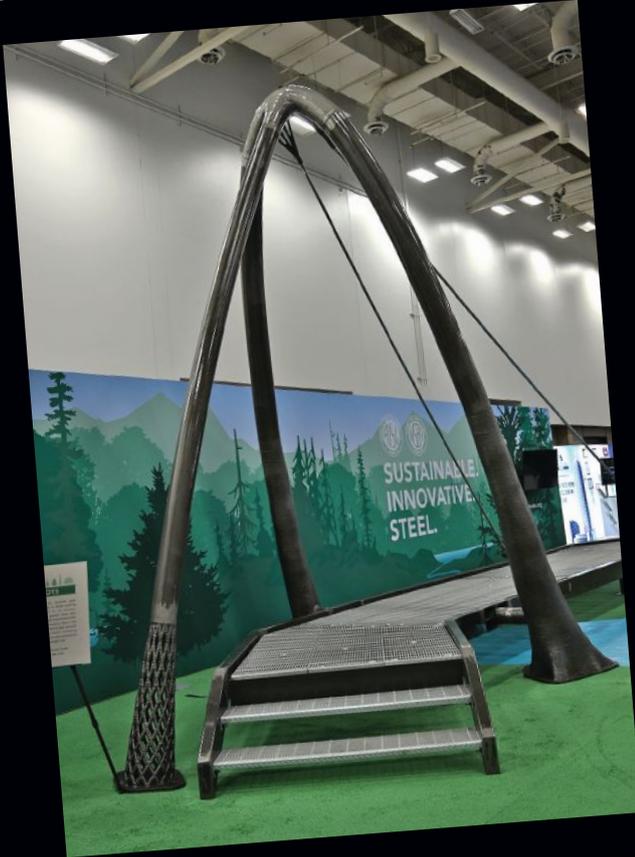
Steel Construction visited on a Thursday in late June, multiple bikers were ascending and descending the ramps on the walk into the building. A bike shop is one of the four ground-floor retail tenants, another is across the street, and another is two blocks away.

The space is also popular with Bentonville-area professionals. Ledger has leasable-by-the-month offices for individuals and groups of up to 16 people. It sells yearly and monthly memberships that can include storage, a personal desk, and 24/7 access, plus daily access passes. Its first floor has small conference rooms, individual offices, group tables, and

bar-style individual seating. On this June day, the first- and second-floor tables were largely full, and a row of five first-floor group office spaces was at capacity.

Northwest Arkansas is one of the nation's fastest-growing regions, and Bentonville is a popular building site. The area had the demand for a concept like Ledger, and local construction hasn't stopped. Another commercial structure is going up directly behind Ledger—and it's also steel.

To learn more about Ledger's design and steel elements, read the "Shifting Gears" article in the October 2023 issue at modernsteel.com/archives. ■



THANK YOU

to everyone who contributed to the success of our additive manufacturing project at NASCC: The Steel Conference in Louisville this past spring!

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